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THE DISPOSAL OF MUNICIPAL WASTE*

Systems and Methods, with Special Reference to American Conditions

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THE CLASSIFICATION OF MUNICIPAL WASTE

Terminology: The Need of Definite Terms.—There is need of a better defined vocabulary of specific terms for use in discussing this subject, as the words and phrases now employed for the purpose frequently have different meanings in different places or when used by different writers.

The American Public Health Association defines the various classes of municipal waste as follows:

ORGANIC

Garbage	The rejected food wastes.
Night-soil	The contents of vaults and cesspools.
Sewage	Water-conveyed excreta.
Offal	The refuse from slaughter houses, and animal substances only.

INORGANIC

Ashes	Household, steam and factory.
Refuse	Combustible articles from all sources; also glass, iron, crockery, house sweepings and generally everything from the house not included in garbage and ashes.
Street sweepings..	Compounded of organic and inorganic substances.

This classification is accurate and comprehensive, but it is extended, and should be condensed for general use. Nearly every writer uses terms for defining particular items that are applicable to others quite dissimilar in nature. Some invent new words and phrases that befog the subject-matter. In describing apparatus and machinery there is frequently a conflict of technical terms which are not common to all, and in reckoning quantities there is the same uncertainty for lack of a definite standard of measurement. This confusion in nomenclature is largely due to the fact that waste disposal by modern methods is a comparatively new subject, with a very limited literature in this country, and with foreign terms and precedents of long use not always applicable to our conditions. The terms employed by the writer are those established by the American Public Health Association, with such modifications as are suggested by the conditions attending practical use.

In Great Britain the general term "towns' refuse"—sometimes called "dust"—is applied to the whole miscellaneous waste collection of the town. It includes animal and vegetable matter ("soft core"), ashes, breeze (cinders mixed with unburned coal), bones, rags, paper, glass, iron, metals, crockery ("hard core") dust and dirt. This is placed, at the house, in a general receptacle called the ashbin, and taken from there in a mixed condition for final disposal. Where there is no sewerage system, the excreta are received by the earth-closet, pail or pan method, and treated and disposed of apart from other refuse.

The American term "municipal waste" is held to include the whole miscellaneous city collection of rejected foods, rubbish, ashes and street sweepings. But there is here a further subdivision of wastes, and a separate collection of each which has brought specific terms into use.

"Garbage" means the animal and vegetable matters removed from houses, stores, and markets. It does not include dead animals, night-soil, slaughter-house offal, street sweepings, ashes or cinders, or anything but organic household waste subject to rapid decay.

This term is subject to modification in various places, as in New England, where "swill," meaning rejected foods only, is used instead of "garbage." In Philadelphia it is known as "slop." In some places it is called "offal," and in the South and some parts of the West "garbage" includes rubbish or refuse, but not ashes.

Where reduction methods are employed, the garbage is more strictly defined. In New York City it means "refuse of an organic nature consisting of swill, every accumulation that attends the preparation, decay, dealing in, storage of, meats, fish, fowls, birds or vegetables, including all food wastes, and not including street sweepings—and not containing more than five per centum by weight of other refuse." Buffalo defines it as "all kitchen or table waste of an animal or vegetable nature, vegetables, fish, meat, bones, fat and all offal, carrion and general kitchen refuse, as clear of ashes and rubbish as it is possible to keep same." The Chicago definition is, "any and all rejected, abandoned or discarded waste of household, vegetable or

* The second of a series of articles on this subject. The first article appeared on February 7.

animal food, offal and swill." In Washington it is "the refuse of animal or vegetable matter which has been used or intended for food."

The word "garbage" is used in places where a clear distinction is required as to the character of the organic waste, and as now commonly used, the word is limited to rejected food waste in all its forms, and will be so employed by the writer in referring to waste.

In some sections of the country waste is not separated except by excluding ashes. Indianapolis provides that the word garbage shall be taken to mean all organic household waste, offal, animal or vegetable matter, such as has been prepared for or intended to serve as food, and in addition shall be construed to mean other industrial refuse, such as paper, cans, bottles, discarded tin ware, iron, and other similar material, excepting ashes, household sweepings and sweepings from stores, business houses and apartments." Though this wording is doubtful, it is assumed that sweepings and ashes are removed separately.

"Refuse" includes all combustible matters like wood, paper, straw, rags, mattresses, broken furniture, house sweepings, discarded clothing of all kinds; also glass, iron, tin cans, crockery, and the miscellaneous collection not comprised under garbage, ashes or street sweepings.

"Ashes" includes the household ashes from all varieties of coal, but not steam or factory ashes from boilers or the large furnaces in hotels and trade and manufacturing establishments.

"Excreta." When there are no sewers, the night-soil contained in vaults and cesspools must for sanitary reasons be removed periodically. This is usually done by the license method, the contractor for the work providing a suitable odorless excavating apparatus, and sealed tanks or barrels for transportation. The cost of removal is paid by the householder under a sliding scale of charges fixed by the town, and disposal is usually made outside the city limits by dumping or burying, very rarely by composting.

The final disposition of this very dangerous matter should be under the strict superintendence and frequent inspection of town health officers, and should not be left to the convenience or caprice of the contractor.

Too often its insanitary disposal on ground draining into the water supply of the town has been accompanied by disastrous epidemics of typhoid fever, as witnessed by the outbreaks of this disease at Plymouth and Butler, Pa.; Ithaca, N. Y., and Columbus, Ohio.

Excreta are sometimes composted with earth or manures, and many attempts have been made to manufacture a commercial product called "Poudrette" by a process of drying the excreta and mixing with marl and other substances, but the offensive character of the material, together with its uncertain value in comparison with other fertilizers of standard composition, has made the method unprofitable.

In one or two places where the collection of night-soil is done under the direct charge of the town, the large returns received have paid for the cost and left a surplus to apply to the general expense of other waste collection.

Night-soil can be disposed of by fire in specially constructed furnaces, and many thousands of barrels of this waste have been and are now thus destroyed annually. A description of these furnaces, and reports of the work, will be presented later. The removal of excreta by a sewerage system is a separate department of municipal work, independent of the disposal of other wastes.

"Dead Animals and Offal." In nearly every one of the larger towns the carcasses of larger animals, such as horses, cattle, swine and sheep, are taken by private parties who conduct rendering works which are not directly under the control of the town except as concerning the sanitary operation of the plant. A payment is usually made by the town, or by the owner of the dead animal, for its removal by the rendering company in a special wagon built for the purpose.

By various processes the carcasses are converted into many forms of commercial articles or substances which afford a large revenue. Smaller animals, such as dogs, cats, rats, etc., are not usually thus treated. They go with the ashes to the dumps or with the night-soil for burial. Where crematory furnaces are installed, these carcasses are burned with the waste, and where there are no rendering plants the carcasses of the larger animals are also easily disposed of in this manner.

Condemned animal food, market and butcher shop offal, and all miscellaneous animal refuse are also disposed of by the private rendering companies without cost to the town. Some reduction companies receive the carcasses and other animal refuse as part of the garbage collection. Generally every remnant of animal life can be utilized in one form or another by various economical means.

"Street Sweepings," while included under the general term of municipal waste, are not in usual practice collected or disposed of except by the town itself, separately from the other wastes, and they are not included in the contracts for collection and disposal of household wastes.

Trade and Industrial Wastes

There are many kinds of trade and industrial wastes which are not generally included in municipal disposal work, but which are still under control of the town and are sometimes provided for by its agency.

When small in amount and organic in character, requiring frequent removal, the town sometimes comes to the aid of the factory or of the merchant and makes disposal of the waste by its own means, for a fixed sum. When, however, the weight or volume of the waste is large, and the material is of inorganic character, means are often provided by the town for its transportation and final disposition by enlarging its own equipment, and it then receives payment *pro rata* for the quantity handled. In such cases the cost of the work is a matter of private agreement, the town performing its duty by publicly assisting a private enterprise for the common good of the community. But the point at which municipal control ceases and private responsibility begins is uncertain and indefinite and the fruitful source of much trouble.

In some localities the right to have waste removed by the town is determined by the number of persons or families in the building or buildings, or again, the volume of waste must not be over a stated amount; or only certain

kinds of waste, strictly defined, may be removed. Manifestly, for a town to favor a private individual or corporation, by the removal and disposal of private matter without a return of some sort, is an injustice to the rest of the community, and an exercise of arbitrary power which should not be permitted.

As a rule, all classes of private trade and industrial waste, and household waste of all kinds above a certain fixed quantity, must be removed and disposed of at the cost and risk of the parties concerned, and not through the agency of the town, unless payment be made of the cost of the work so performed. But the town is expected to furnish ground for dumping, or other satisfactory means for the disposal of all waste, when collection is made by private agency.

The Proportions of Each Class of Waste

It is a difficult matter to give accurate data determining the proportions of waste, as each locality is governed by its own special conditions. But it is possible to give a few statistics from the larger cities where records are accessible.

Table I. Total Quantities per 1,000 of Population per Annum of Garbage, Ashes, and Rubbish in Six Cities.

	Population.	Totals, Tons.	Per 1,000 of Pop.	Pounds per Capita.	Area, Sq. Miles.
New York; Boroughs of Manhattan and Bronx..	2,530,000	1,656,812	654	1,313	62½
Brooklyn	1,394,000	581,880	417	834	77½
Boston	530,000	329,059	620	1,241	42
Washington	295,000	98,000	332	664	69¼
Buffalo	373,000	204,861	548	1,098	42
Baltimore	509,000	380,000	746	1,492	31½

Table II. Percentage Proportions of Waste.

	Garbage, Tons.	Per cent.	Rubbish, Tons.	Per cent.	Ashes, Tons.	Per cent.
Manhattan and Bronx	201,333	12.1	119,021	7.2	1,336,456	80.7
Brooklyn	81,297	14.	48,365	8.3	452,218	77.7
Boston	80,929	24.6	15,249	4.6	232,881	70.8
Buffalo	21,029	10.2	16,947	8.3	166,885	81.5
Washington	32,832	36.	12,181	13.	47,788	51.

Table III. Average Percentages by Weight.

	Craven; New York, 1900.	Parson; New York, 1903. By Weight.	Parson; New York, 1903. By Volume.	Hering; Trenton.	Pelletier; Montreal. Summer.	Pelletier; Montreal. Winter.	Morse. O'Shea; Boston.	Morse. Average of 10 Towns.
Ashes	81	80	57	75	10	60	70	76
Garbage	12	13	18	21	65	25	20	14
Rubbish	7	7	25	4	25	15	4	10

The variations in amounts in these cities are partly due to the methods of collection, being by municipal service in New York, Boston and Brooklyn, and by contract in Buffalo and Washington. The use of natural gas for household fuel in Buffalo changes the proportion of ashes and rubbish, while climatic conditions and character of population in Washington vary the ratio of garbage and ashes. The area of ground included in the city limits is a factor to be taken into account as affecting the quantities, as shown in Brooklyn by the relatively small amounts with proportionately the largest area of territory. These figures must be taken as approximations only.

The proportions of various wastes in these tables are based upon the separate collection of each class, the division of each and the deposit in separate vessels being done by the householder. They are affected by climatic conditions, as shown in the differences in summer and winter at Montreal and the smaller amount of ashes at Washington. The climatic conditions of this country, varying from the high summer temperature of the tropical South to the extremes of cold weather in the North, make any comparison on these lines of little value; but if places within the same parallels of latitude are taken, it is possible to arrive at better conclusions.

This question of relative quantities is important when estimating amounts for collection. A rough method of calculating average quantities for Northern towns not in the natural gas territory, and where anthracite coal is used for fuel, is to allow three-quarters of a pound of garbage per capita, one ton of rubbish for each 10,000 persons, and one ton of ashes for each 650 persons as the average daily collection. The proportions change somewhat with the seasons; when soft coal is the fuel, the ashes are reduced one-half, and when wood is used there is greater loss.

The Separate Collection of Wastes

The separate collection of garbage has generally been made in the Northern towns. Of 96 towns reported by Chapin* as having a separate garbage collection, 89 were north of latitude 30. Seven towns in the Southern States collected mixed waste. The statistics published by the general government of 174 towns with a population of from 25,000 upwards give 53 as not reporting or having no collection service whatever. Of these, 10 were in the Southern States.

There are several reasons for a separate garbage collection. The amount is approximately only ten per cent. of the whole bulk of waste, it is the most objectionable class, and it must be removed more frequently than any other. When in a cleanly condition it may be utilized in the reduction process or fed to swine. In most places the regulations for separation impose fines, on the refusal to remove, when garbage is mixed with foreign matters.

In Southern towns it is the custom to collect garbage and rubbish together. Sometimes ashes and manure are included, and occasionally dead animals, and when thus mixed the only practicable disposal is by cremation, or by burying in the ground.

Only in a few of the larger cities is the separation of ashes from garbage and rubbish completely accomplished. New York, Brooklyn, Boston, Washington and Buffalo have means for the recovery of the saleable parts of the rubbish, and other large cities are considering the installation of rubbish stations. In the remaining towns and cities the ash collection includes the rubbish; the whole is discharged together, a small part of the rubbish being recovered by dump picking.

* "Municipal Sanitation in the United States," Dr. C. V. Chapin, Providence, 1901.

Where there is a separate collection the burden of it comes upon the householder, as he is required to have three cans or vessels and to keep them in accessible places; he is also held responsible for their cleanly and serviceable condition. The room used for their storage and the care exercised in filling them are a considerable tax upon the convenience and patience of the house occupants.

THE COMPOSITION OF GARBAGE

In dealing with separated garbage, its character and composition must be taken into account. Several analyses have been made, but there is need of a more extended and accurate quantitive analysis than any we now have.

TABLE IV. AVERAGE PERCENTAGE COMPOSITION OF GARBAGE.

	Waring; New York, 1896.		Craven*; New York City, 1899.	Fetherston; Atlantic City, 1901.	Hering; Trenton, 1903.
	Per cent.	Weight.	Per cent.	Per cent.	Per cent.
Moisture	71 =	1,420 lbs.	70	82	80
Solids, animal and vegetable	20 =	400 "	25	18	16
Grease recoverable.	2 =	40 "	3		
Non-combustible ..	7 =	140 "	2	..	4
	100 =	2,000 lbs.	100	100	100

Waring's report in 1896 was upon the average of 3,000 tons of summer garbage from different cities, treated by different methods of reduction. Craven's report, on one reduction plant, shows better methods. Fetherston's and Hering's figures were from cremation plants, where nothing of value was recovered.

THE WEIGHT OF GARBAGE

There is no standard of weight of garbage in relation to volume which can be guaranteed to be accurate. While the component parts are well known and are fairly constant in nature, the included water varies widely according to local conditions.

This included water may be thus divided:

(1) The contained moisture in the organic composition of all vegetable substances, varying according to the nature of the vegetable. The summer garbage of American towns during the melon and fruit season carries a much larger quantity of liquid elements than the same amount of garbage does in the winter, when it is composed of the drier and more compact vegetable refuse.

(2) The free water, or liquids held in suspension in the interstices of the garbage by capillary attraction, coming from household cooking and washing, or from snow and rain falling into the uncovered garbage cans or carts. When this free water is allowed to drain off, the integral character of the garbage is unchanged, but the weight is reduced.

The following table of weights taken in various places gives an idea of the differences in weights in localities:

* Advances in Waste Disposal, American Public Health Association; Vol. XXV, 1899.

TABLE V. APPROXIMATE WEIGHT OF GARBAGE.

	Pounds per Cubic Yard.	Pounds per Cubic Foot.	Cubic Feet per Ton.
New York	1500 to 1526	56.5	36
Boston	1200 " 1188	44.	45
Philadelphia	1500 " 1498	55.5	36
Washington	1500 " 1526	56.5	36
Pittsburgh	1500 " 1526	56.6	36
Newport, R. I.....	1400 " 1404	52.	38

NOTE.—The method used for analysis in New York City was to take a given quantity from each of three strata or layers of garbage collected in scows containing 350 tons each. These quantities were mixed thoroughly, and after being separated into samples, the mean of the analysis of all was taken to be the average. In other cases the weights were averaged from the totals of a given number of loads.

This table gives an average of 1,450 pounds to the cubic yard, 54 pounds per cubic foot, and 38 cubic feet to the ton, and may be taken as representing the average collection of Northern towns where the garbage contains a normal percentage of moisture.

If the free water (estimated at twelve and one-half per cent. by weight) be omitted, then the figures would be 1,270 pounds per cubic yard, 47 pounds per cubic foot, and 42½ cubic feet per ton. These figures are submitted with the hope that they may lead to the examination of garbage and the reports of weights and volumes, which will help to establish a standard for common reference.

THE FERTILIZING ELEMENTS OF GARBAGE

There is a well-known value in garbage as a fertilizer for poor soils, but the proportion of plant food is less than is popularly estimated.

TABLE VI. AVERAGE ANALYSIS OF GARBAGE (CRAVEN).

Water	65.90
Total solids	34.10
Nitrogen	0.86
Fat	7.07
Phosphoric acid	0.07
Potash	0.03
Mineral matter	8.48
	116.51

In fresh garbage the chief constituent of value is fat or grease, which must be recovered by steam or solution process, the quantity per ton averaging 3 per cent., equal to sixty pounds. The remaining fertilizing values are approximately, phosphoric acid, 0.65 per cent.; ammonia, 0.65 per cent.; potash, 0.15 per cent. These small proportions of plant food are present in the green garbage, and when the application of this to the soil is made by the crude method of plowing under it is attended with difficulties that are hard to overcome. It is strongly advocated by many, who argue that there must be a return to the ground of organic matter taken therefrom, to prevent a possible food famine in some far distant future, but it does not appear that efforts in this direction are successful. Many American towns have tried this method, and nearly all have abandoned it because of the nuisance produced, or for financial reasons. Large areas of suitable lands are seldom found in the vicinity of large towns; the presence of foreign substances in the garbage is embarrassing and detrimental, and the soil so treated must have time to oxydize and assimilate the garbage before another dose.

When garbage passes through the various stages of grease extraction by steam or naphtha, pressing, grinding, drying and commonly known as the reduction or ex-

traction process, the fats are separated and the solid portions, called "tankage," then contain the fertilizing element in a concentrated form. This method of treatment will be considered later.

Agricultural Utilization

This method is used in all parts of Europe except Great Britain, and the reports made in Paris by the chief engineer in charge of this work are instructive:

"In Paris house refuse is known as garbage (gadoues), and is composed of all kitchen refuse and any remnants produced by the sweeping of the inside of public properties or private buildings, not mixed with industrial waste, earth, gravel or rubbish. It is contained in pails having a maximum capacity of thirty gallons. The broken crockery, glass, etc., are deposited in separate receptacles. The garbage is collected by the city laborers, and removed by contractors in carts of six cubic metres (7.85 cubic yds.), and sent directly to the fields by wagon, rail and water, where it is delivered to the farmers. The quantity is six hundred thousand tons yearly. But the contractors have raised their bids, because the fields on which it is possible to utilize the garbage are growing fewer near Paris, and the suburban towns are refusing to allow it to be deposited on their grounds; and the farmers are able to buy chemical fertilizers at cheap rates, and will pay only a low price for the garbage-fertilizer, which requires careful sorting. Without such sorting their fields are strewn with tin cans, broken crockery and glass, etc., which are dangerous to their horses' hoofs."

To bring it into a better condition for use by the farmers, the garbage is sometimes ground into a homogeneous mass, at grinding stations located as near as possible to the centers of removal.

This process, as reported by M. Tur,* has some interesting and novel features:

"The ground garbage looks like vegetable earth, mixed with bits of paper and straw. Its odor is hardly perceptible, can be endured for a long time, and may be removed by sprinkling with lime water.

"The ground garbage can be used in the fields without giving the same trouble as the original garbage, all débris troublesome or dangerous to the farmers having been removed.

"Hygienic considerations do not seem to enter into the question of the adoption of one or the other method (utilization or incineration) provided the agricultural utilization does not bring the garbage storehouses near the inhabited centers."

This method seems to have been invented to overcome the reluctance of the farmers to receive the garbage in its rough state, as "they will not take the least trouble to procure this fertilizer."

The grinding stations are increasing in number, as, besides the first plant built in 1896, there are two others under construction, and the companies have put in bids to treat by similar process the garbage of the other nine boroughs of the city.

Experiments in incineration showed that the garbage was self-burning, *i. e.*, that it would burn without any addition of coal, and it is recommended that there be installed a destructor of the English type as near as possible to the center of the borough which it serves, to reduce to a minimum the charge for hauling.

The disposal of refuse in Paris is complicated by the existence of rag-pickers, numbering upwards of 25,000, who from long-continued custom have a vested right to first sort over the refuse. They are authorized by the janitors of houses to make the first collection from the pails before emptying, a second picking is being made while the carts are being filled, and the third in the stations at the trans-shipment of the garbage.

The objects sought for are rags, paper, bones, leather, white glass, tin cans, iron, bread, orange peel, snail shells, etc. The rag-pickers are always interested in all improvements for the disposal of refuse, fearing their occupation may be injured for the benefit of some contractor, and at different times their protests have been strong enough to stop improvements requisite for the public health.

With the exception of Great Britain, all European countries employ this method of agricultural utilization, and have done so for centuries. At Brussels, Belgium, the records show continuous reception and treatment of refuse from 1560 to 1845. The collection is made by contractors who sell to the farmers at low cost, the difference in transportation being paid by the city. There is now a marked movement for improved methods, and destructors of the English type have been installed at Brussels, Hamburg, Berlin, Zürich, Nice, Geneva and Gibraltar, and are under consideration in many other large cities.

Madrid (Spain) seems to have reached the highest point in economy, and the lowest in sanitary protection, by the curious system of agricultural utilization prevailing in that country, described as follows by an American observer:* "The disposal of the garbage of the city is divided among two forces—one public, the other private. First there is the force administered by the city, which is charged with the disposal of both the street sweepings and the garbage. In practice, however, almost all of the latter is disposed of through people who adopt the collection of garbage as an industry. To engage in this business a special license must be purchased from the city, which allows the holder to ply his trade within a specified district. The service is rendered to the householders gratuitously, the only pay received for the work being the garbage itself. Those who are engaged in the business are generally aged men and women, who take the refuse away by means of donkeys carrying woven baskets. Only the absolutely worthless is thrown away, which, to these people, means a very small portion. Every rag is carefully saved, washed and dried; all the bones, scraps of paper and bits of straw find their way to different piles, all of which are marketed separately. Every scrap of bread or vegetable which can be made to serve for food for man or beast is put to use. Finally, what is left is sold as fertilizer. . . . The relief, direct and indirect, thus afforded the public finances by this method of collection is its only recommendation, for the refuse is uniformly carried in open baskets from which the smaller particles are easily blown by the wind, and the disposal made of the vegetable parts is far from conducive to public health. The better portion serves as food for the collectors themselves, and the rest is regularly fed to chickens, rabbits and hogs kept in the small courts of the poorer districts of the city. Such a method of disposal, it is needless to say, constitutes a constant menace to sanitary conditions in normal times, and an excellent means of spreading disease in times of infection."

* "The Removal and Utilization of Refuse in French Cities," by P. Tur, Engineer.—Trans. Am. Soc. C. E., Vol. LI, 1904.

* Chester L. Jones, in *The Annals of The American Academy of Political Science*, Vol. XXVII, 1906.

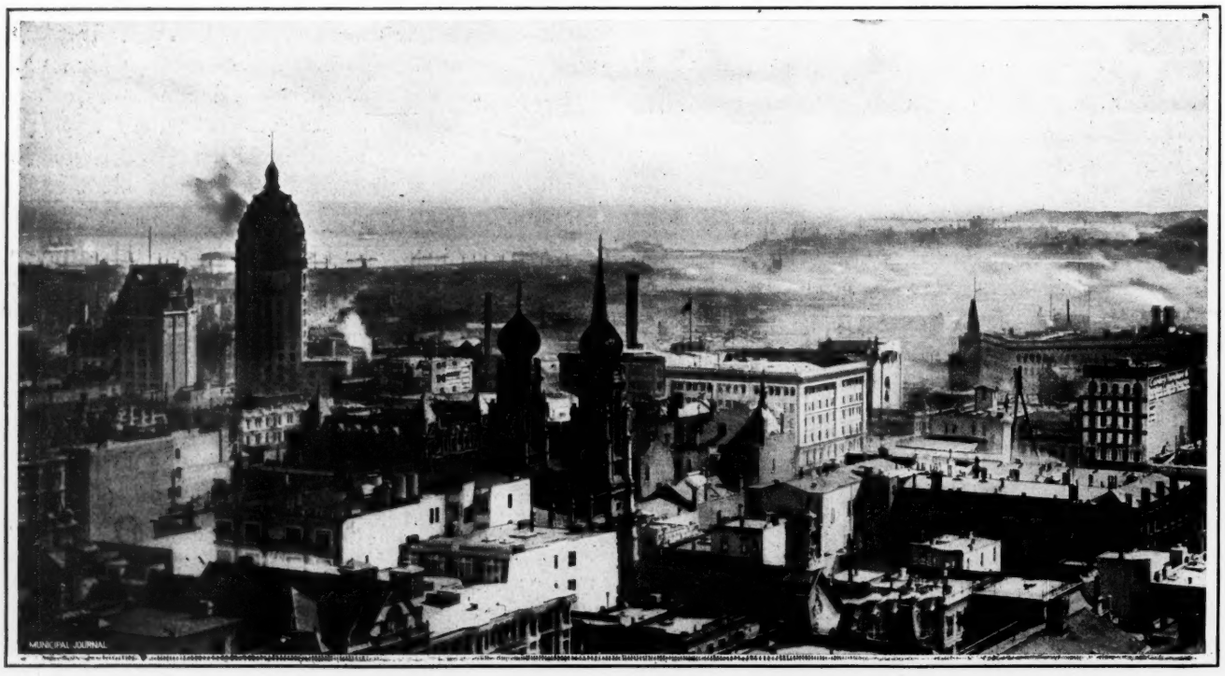
THE GOLDEN GATE CITY

SAN FRANCISCO, a many sided city, has much of interest to offer, whatever the motive of the visitor may be. There is little in it now to remind one of the "days of old, the days of gold, the days of '49," when gold mining was the chief industry and few thought of the country they prospected over as destined to be sought within fifty years for almost everything else beside gold mines. True enough, the "old timers" yield grudgingly to the new comers and the new ideas, but if they do not yield they die; and some of them, at least, have left inestimable legacies for posterity.

The population of San Francisco, according to the Federal census of 1900, was 342,782, and a comparison of the school census with the Federal census indicates a present population of 432,000. Not only is the city growing fast, but the suburbs and nearby cities are all experiencing prosperity. Commerce with Alaska, the Hawaiian Islands, the Philippines, China, Japan, and other countries on the littoral of the Pacific is growing fast and trade with inland points is spreading out. The vast fruit and grain crops largely find an outlet here, and in a general way San Francisco dominates and controls the trade of the Coast. Of course, other trade centers are coming into prominence, but San Francisco is *facile princeps* and doubtless always will retain a position on the Pacific analogous to that of New York on the Atlantic. The city has large manufacturing interests and several ship-yards, chief of which is the Union Iron Works at which were built the Oregon and other vessels contributing to our naval prowess.

Long a city of but one railroad, the Santa Fe now divides the patronage of San Francisco with the Southern Pacific, and Gould's Western Pacific is fast pushing its way westward. Other big roads are also reaching out for a terminus on the Pacific.

The efforts being made for greater civic beauty may be regarded as proof that much is still to be desired from an æsthetic point of view, but the city has at least a start toward the end in view. Golden Gate Park, Sutro Heights and the Cliff House are known to everyone who has ever come to the city by the Golden Gate. The park, owing largely to the climate which permits palms, tree-ferns and delicate flowering plants to blossom unprotected through the winter, is one of the most notable in the world, created though it was where the sand dunes gave little encouragement to the landscape gardener. The general character of building improvements is high, whether one has in mind residences, business houses or public buildings. The Government maintains here a large garrison on the Presidio military reservation, within the city limits; on Alcatraz Island, which is at once a fortress, a military and Indian prison; at Yerba Buena Island, where there is a training school; at Mare Island, where there is a Navy Yard; at Fort Mason, Fort Baker, and other forts at or near the entrance to the harbor. The University of California has its principal building in Berkeley, on the eastern shore of the bay, the medical and law and art departments being in San Francisco. There are excellent public and private schools, many handsome churches with able preachers, numerous theatres, and innumerable other forms of amusement. The people as a rule are well educated, liberal and progressive. At the present time, and for four years past, its civil administration is Union Labor, that ticket, with the aid of independent Repub-



SAN FRANCISCO—LOOKING EAST FROM HOPKINS' INSTITUTE

licans and Democrats, having made a clean sweep at the November election, returning to office for the third time, by a big majority, Eugene E. Schmitz, an honest, capable and immensely popular citizen. His past two terms of office have been a liberal education to him in politics and municipal government. Having for the first time a Board of Supervisors (which corresponds to the usual City Council) in harmony with him as well as the full control of other Boards and Commissions, the Mayor and his confidential adviser, A. Ruef, promise great reforms and a model administration.

SAN FRANCISCO—THE CITY HALL

Two problems have been taken up for solution in the early future. The physical advantages of the location offer a tempting opportunity for beautifying the city on lines conforming therewith, and in consulting Mr. D. H. Burnham, the well-known civic architect, the Society for the Improvement and Advancement of San Francisco has recognized the necessity of being properly guided from the start. He is enthusiastic as to the possibilities involved in the city's location at the northerly end of a great promontory, forty miles long, which leaves the city landbounded only on the southern side. It is proposed to devote $1,000,000 a year to the gradual realization of his ideas. These have already been worked out in considerable detail, a force of draughtsmen having been kept at work for about a year, by a grant of $15,000 raised by the Society.

An important part of Mr. Burnham's plan is the formation of broad terraces, with granite step approaches, to replace the steep acclivity, beyond Market street, which now interposes an awkward barrier to the ascent of the hill. The present park area is to be doubled, at least, and future public buildings are to be erected in what is now regarded as the border land between the business centre and the residence section. An inner and an outer boulevard are to be formed, and the banks of a creek are to be terraced and parked. Telegraph Hill is to be protected from the ravages of quarrymen and an acropolis is to be erected on it.

Closely connected with the scheme thus briefly outlined is a project evolved by Mr. William Barclay Parsons, Engineer of the New York Rapid Transit Commission, for securing a scientific development of the city's street traffic facilities. These now include 153 miles of route, with 288 miles of track, all in the hands of companies, and operated in part by electricity, cable, horse and steam. The traffic on these lines is found to increase at a greater ratio than the growth of population, and now amounts to 154,000,000 per annum, to which should be added 40,000,000 who prolong their journey by transfers.

Mr. Parsons recommends the exclusive use of electricity, believing that "the maximum efficiency is rendered by a transportation system when the methods of operation are reduced to the simplest form with absolute uniformity." He ascribes the adoption of the conduit system in New York to "an accident," while in Washington its adoption was at least facilitated by the provision previously made for cable traction, the sub-structure being in place. In Boston, he states, the system was a complete failure. "New work on conduits [in New York] is practically limited to the conversion of horse lines in

SAN FRANCISCO—PALM AVENUE, SUTRO HEIGHTS PARK

Manhattan, of which only 5.4 miles are in hand at present, while of overhead trolley fifteen miles are actually in progress, with thirty-five miles projected."

The report enters at length into the discussion of the best methods for the trolley system, the statements made being illustrated by numerous references to foreign practice in the use of wire attachments, central and side poles, and other appliances.

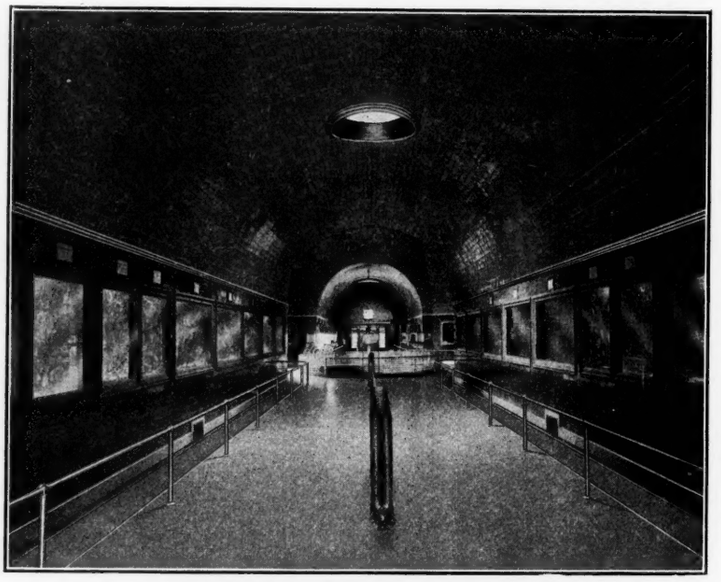
The case of New York is further referred to in connection with a proposal to form a terraced roadway on a very steep street, with a tunnel for cars, the latter feature being similar to the New York structure. For the former, it is proposed to adopt a gradient of 15 per cent. as the practical limit of horse traction, and to utilize this, in an 85-ft. street, by forming an 18-ft. winding road, giving access to a district in which there is now "a wall nearly one mile long without openings, separating the business district in the vicinity of Kearney and Montgomery streets from the best residential district in the West."

The report from which these notes on the transit problem are compiled was procured by the Merchants' Association of San Francisco—a body to which the city is indebted in other respects for public-spirited action in its best interests.

TOLEDO, OHIO, has secured a verdict for fifty dollars and costs against a citizen charged with collecting and hauling garbage through the streets of the city, contrary to ordinance.

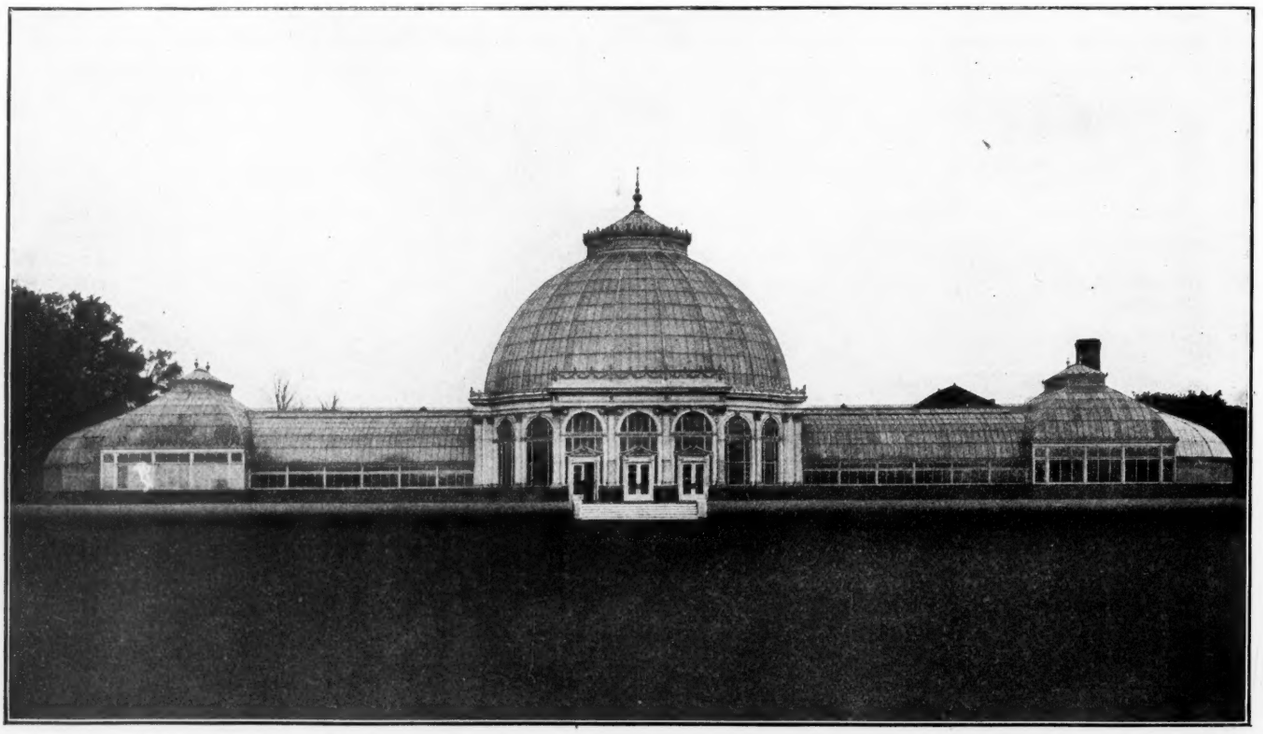
The Parks and Boulevards of Detroit

IN keeping with the subject treated, the reports issued by the Department of Parks and Boulevards of Detroit,



GROTTO—AQUARIUM

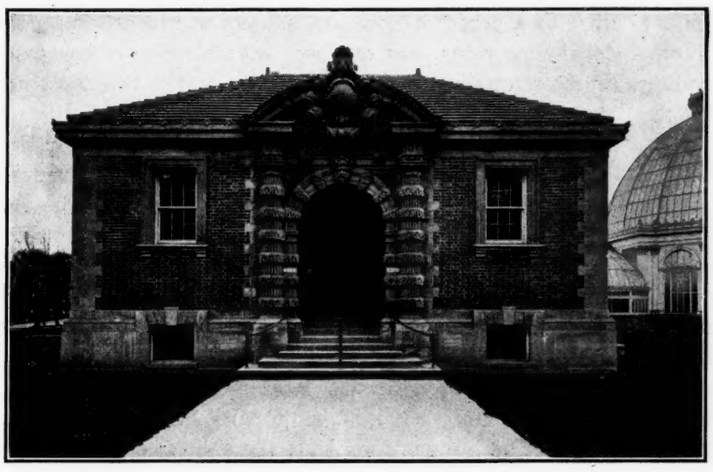
Mich., are things of beauty to be treasured in every civic library. The publication covering the year ended June 30, 1905, is no exception to the rule, paper, typography and illustrations being all worthy of the interesting matter contained between its covers. Attention may be directed to the growth of the expenditure in the Department, this having risen from a modest $1,870 in 1854 to $260,000 in 1904, the two years of heaviest outlay being



CONSERVATORY—BELLE ISLE PARK

1892 ($497,756) and 1901, when $468,139 was required to meet the demands of the system.

With a population of 340,000 and a city acreage of 18,560, Detroit has a total park and boulevard acreage of 1,194, the estimated value of the entire system exceeding ten million dollars. Belle Isle Park, two miles in length, has nearly fifteen miles of driveway, including over five miles of shore drive, but exclusive of five miles of gravel walks. There are in all twenty-eight parks, with fourteen miles of boulevard, in the total area named above.



NORTH FRONT OF AQUARIUM

A noteworthy feature of this municipal undertaking is the automobile service operated by a local company, which pays the Department five per cent. of the gross receipts, together with one-fourth of the wages of the cashiers. Thirteen phaetons are now in service, and as ten of these will soon have to be replaced, the question has already arisen whether, in view of the increasing patronage, the service should be taken up directly by the city. A municipal street car line from Jefferson avenue to the Belle Isle bridge is recognized as a necessity, and the proposed automobile service could be operated in unison with it. The cash receipts from the phaetons, during the year under review, were $11,203, the total number carried being nearly 60,000.

Band concerts in four of the parks are "no longer considered a luxury." "On a summer evening the canals in Belle Isle Park, which the band pavilion spans, might be likened to the canals of Venice, the exception being that canoes instead of gondolas are used, while the shores of the canal within hearing of the music are a surging mass of humanity."

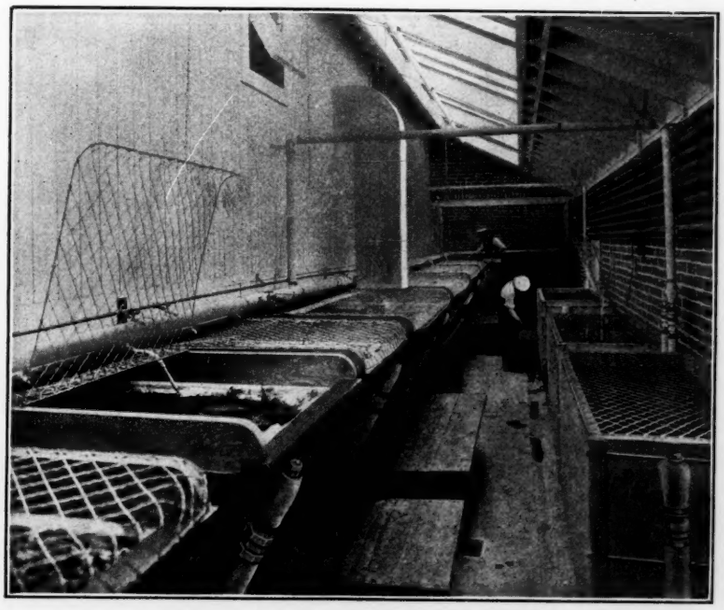
The aquarium, completed and opened to the public July 24, 1904, has proved popular to a degree far exceeding the most sanguine hopes of its promoters, a daily average of two thousand persons having visited it since the opening day. There are forty-four exhibition or wall tanks and three pools in a building 250 feet long by 72 feet wide. The total capacity of tanks, cisterns and pipes is 73,000 gallons, and a volume of 57,000 gallons is kept in constant motion by pumps, the water in the main tanks changing many times daily. The 30,000 gallons of sea-water required was transported from Wood Holes, Mass., where it is exceptionally pure and dense, and sufficient fresh water is constantly being added to replace the loss due to evaporation. The aeration of the water, an important matter for the specimens living in it, is effected by special pumps.

The bath-house accommodations are admittedly insufficient to meet the growing demand, and the erection of a new building is urged in the report. We are indebted to Mr. M. P. Hurlbut, Secretary to this enterprising Department, for facilities enabling us to illustrate some items of the work under his care.

The Meter System in New York

At a hearing, February 20, dealing with the subject of water waste in New York, Chief Engineer De Varona, of the Department of Water Supply, urged the universal adoption of the meter system. This, he said, would require three or four years, and he estimated the cost at $6,600,000 for Brooklyn alone, but he felt that the cost would be justified by the saving effected. In that borough the consumption of water per capita is 50 per cent. greater than in Manhattan.

In connection with this subject, Commissioner Ellison, of the Department of Water Supply, Gas and Electricity, has started an investigation of the Water Register's Bureau, with special reference to the alleged absence of meters from services which ought to be so supplied. He believes that a large quanity of water has been "wasted, lost or stolen by reason of the non-metering of properties."



ATTENDANTS' PASSAGE—AQUARIUM

STREET RAILWAY FRANCHISES IN MASSACHUSETTS

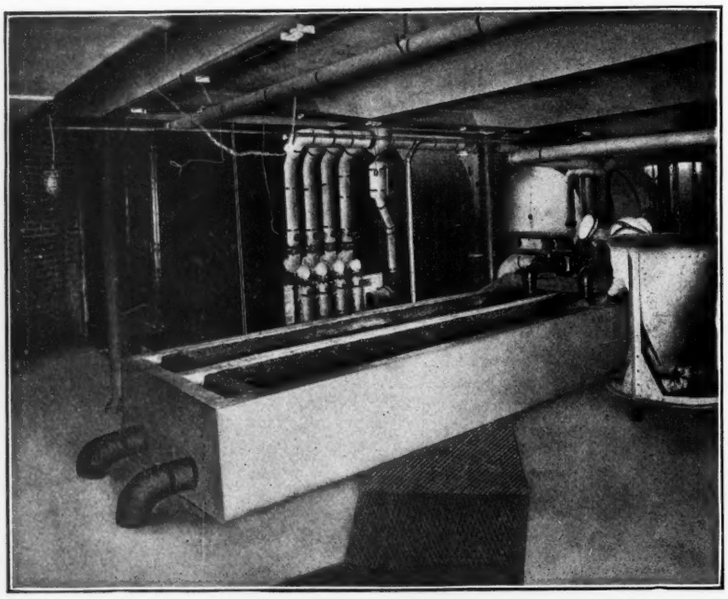
Mr. Walter S. Allen, Secretary of the Special Street Railway Commission of Massachusetts, 1897, contributes to *The Annals of The American Academy of Political and Social Science* an article in which successive stages of street railway legislation in that Commonwealth are presented. Massachusetts was among the earliest States in which street railways were provided, and it has also the distinction of having consistently adhered to the policy of a fair show for the public and the street railway companies alike, a Board of Railroad Commissioners standing between the two in such a manner as to command the respect of each.

The history of the Commonwealth's street railway charters dates from 1853, when two were granted, one for a line between Boston and Roxbury, the other for a line from Boston to Cambridge. Thus, the first street railways were interurban, rather than urban, in character. Fifty years was the period named in these charters, but this was changed, only a year later, by an amendment providing for the removal of the tracks whenever a majority vote of the Mayor and aldermen so decided, and this revocation principle has never been deviated from since its introduction at that early period. Even the original charters of 1853 provided for the purchase by the municipalities of "all the franchise, property, rights and machinery of the company at any time after the expiration of ten years from the opening of any part of the road, by paying for these rights such a sum as will reimburse to each person who may then be a stockholder therein the par value of his stock, together with a net profit of ten per cent. per annum from the time of the transfer of said stock to him on the books of the corporation, deducting the dividends received by said stockholder thereon." One charter, granted as far back as 1875, made provision for joint use of tracks by different companies, and in 1863 a general law was passed in which the conditions of such uses were more clearly defined.

"By 1864 the spread of these street railways had become so great throughout the Commonwealth that an attempt was made to unify the laws, and in that year a general law was passed to govern them. In this general law the feature of a perpetual location, subject to revocation by the local authorities, was retained, and definition of the space in the streets in which the pavement was to be maintained was defined to be the space within the tracks and eighteen inches on either side. In this law the provisions existing in many of the original charters providing for eventual municipal ownership of the roads were eliminated. But this general law was evidently not an entirely satisfactory statute, for in the same year a Commission was appointed by authority of the legislature to investigate the whole subject of street railways. This Commission made a report to the Legislature of 1865, and submitted a bill which failed of becoming a law. Even at this early date it was recognized that the local authorities had in many cases imposed unjust burdens upon the railways, and that the power to revoke locations might be improperly used, so that the Commission recommended that extraordinary conditions must be shown to be based upon good and sufficient reasons; that these reasons must be stated, and must be good in law. It also recommended that there should be an appeal to the courts from an order of revocation issued by local authorities. As the subject of the creation of a Board of Railroad Commisssioners was then under discussion, this Commission recommended that, in the event of its creation, this Board should have jurisdiction of street railways as well as of steam railroads, but, as stated, all these recommendations failed to become law.

"It was not until 1871 that a Board of Railroad Commissioners was established and given jurisdiction over street railways, and at about the same time the law in relation to them was codified. Under this law the street railways operated until 1898 with but few changes.

"The most important of these modifications of the original law was the passage, in 1894, of the so-called "anti-stock-watering laws." These laws, which were made to apply to all of the public service companies, were intended to prevent the issue of stock without adequate payment for the same, and provided that street railway companies must obtain the sanction of the Board of Railroad Commissioners for any new issue of stock or bonds, and that such an issue should be made at a price fixed by the Board, but at not less than par. The price fixed was to be determined by the actual market price of existing shares and by other pertinent conditions. The practical working of this law has been different from that intended by



DETROIT: SEA WATER FILTER—AQUARIUM.

its authors. It was difficult for the street railway companies to go before the Board and show the exact cost of needed extensions, and request the authorization of stock issues to cover the cost, and the Board was naturally reluctant, after being put in the position of guardian of the people's rights, to assume that the cost of contemplated work was correctly stated. Moreover, changes might vary in a marked degree the cost of the work during the progress of construction. The practice, therefore, has grown up of the railways going ahead and completing desired extensions, incurring a floating debt for the work, and then, after completion of the work, going to the Board and asking for the authorization of an issue of stocks or bonds for the payment of the debts so incurred. In many ways this practice has been expensive, and the condition of the money market has often been such that companies have refrained from making improvements which would have been undertaken had there been power in the company to issue new shares in advance of the work. While these laws have undoubtedly been of advantage in preventing the wholesale watering of street railway stock at the hands of promoters, they have been disadvantageous to the conduct of honestly managed enterprises."

So matters remained until the new set of problems, due to the successful institution of electric traction in 1888, showed the necessity of amending the laws in this respect. "The Legislature of 1897, therefore, passed a resolution authorizing the Governor to appoint a committee of three persons, to be known as the 'Committee on the Relations of Street Railways to Municipalities,' to sit during the summer and report to the Legislature of 1898 what changes, if any, were desirable in the street railway law, especially as it concerned franchises and taxation. Governor Wolcott appointed as members of this committee Hon. Charles Francis Adams, Hon. William W. Crapo, and Hon. Elihu B. Hayes, and they immediately began the work of investigating the conditions as they existed both in Europe and America, and heard the railway companies, the municipalities and those citizens who had plans to offer for any changes in the law." The committee was soon confronted by the operation of the State law in regard to the taxation of franchises, which has been in force since 1862. Under its terms the municipalities assess the value of the tangible property of a corporation within their boundaries, while the State determines the total value of the capital stock, as shown by sales or otherwise. "From the total value of the capital stock of the corporation, as determined by the Tax Commissioner, there is deducted the value of the tangible property of the corporation, as determined by the local assessors, and upon the difference in these values the State levies a tax at a rate equal to the average rate assessed upon property in all the towns and cities of the State. The State after collecting this tax distributes the proceeds among the several cities and towns in proportion to the shares of stock in these corporations held in them, retaining in the State treasury the tax upon shares held outside the State. As the tax is in this way paid directly by the corporations, the shares in Massachusetts corporations are not taxed to the holder living within the State. Evidence was presented to the special committee of 1897 showing the burden which the existence of street railways placed upon the municipalities in regard to the repair of streets, and it was shown that the introduction of heavy electric cars, running at high speeds, had increased this burden. On the part of the street railways it was shown that there was a constantly increasing burden put upon them by the requirements made by the city in regard to paving and repairing streets and caring for snow and ice.

"The committee took two radical steps in regard to taxation. Realizing the justice of the claim of the municipalities as to their burdens, it proposed the distribution of the State tax on street railways according to the mileage of track in each town or city, and not upon the shares of stock held in each, and further, it presented a plan for the commutation of the charges for care of the streets, based upon the gross earnings of each company, relieving them of the work on the streets. It was of course not possible to change existing contracts under which the roads were operating, but an attempt was made to secure to the municipalities an individual control of the surface of the streets, the railways commuting their obligations to care for the streets into a money payment.

"As regards the tenure of franchises, the existence of perpetual revocable franchises was seen by the special committee to be an anomaly, but they had worked well under Massachusetts conditions, and in practice but two attempts had been made to revoke franchises. In both these cases public opinion caused the speedy repeal of the revocation order. The committee felt, however, that the interests of the stockholders in street railways ought to be protected against hasty action on the part of municipal authorities, and they recommended giving the roads a right to appeal to the Board of Railroad Commissioners from any order revoking a location which might be made by the local authorities.

"There were a number of other changes proposed, mostly of a minor character, the most important being the grant of the right to the Railroad Commissioners to give a location to an interurban road in a town where it had been refused or burdened with unjust conditions by the local authorities. This change was due to the fact that it was found that some of the smaller towns had attempted to 'hold up' interurban roads which were obliged to build through their limits in order to connect larger towns, and it was based upon provisions in the law relating to telegraphic companies.

"This Act, submitted to the Legislature of 1898 by the special committee, became a law substantially as presented, but to a large measure was only applicable to the railways outside of Boston. In Boston a statute granting rights to the Boston Elevated Railroad, passed in 1897, provided that, so far as taxation was concerned, no change should be made in that Act for a term of twenty-five years."

The general revision of Massachusetts statutes in 1904 led to the grouping, in a single chapter, of all the street railways previously enacted. Mr. Allen notes, in this connection, the preponderance of physical and eco-

nomic changes in the situation over those due to legal action, and reviews the former from the date of the opening of the first horse railroad in Boston, in 1856, until September 30, 1904, when there were 2,652 miles of electric track operated in the State. He notes in passing that in 1888, when the success of electric traction was first practically demonstrated, no more than 562 miles of track had been laid down, although thirty-two years had elapsed since 1856. Contrasting the earlier conditions with those now prevailing, he traces the rapid extension of rural and interurban roads and shows how the resultant consolidations have led to the building up of street railway systems covering large areas, forced in time to assume the position of active competitors of steam railroads. With this have come both problems and disappointments. The former have been mainly connected with fares, while the latter have been found in the failure to secure permanent business in sufficient volume to pay for the more expensive roadbed and equipment, the heavier rail and larger cars. Then, too, the ever-present difficulty of traction has a direct bearing upon the fares problem, the popular idea being that "all public service companies should make some payment to the municipalities in the form of franchise taxes, or special taxes of some sort, for the use of the streets." The fact that taxes are a part of operating expenses and are directly assessed upon the user seems to have been entirely lost sight of. It is popular to say that any corporations using the streets should pay for the right, just in the same way as it is popular to say that governments, either city or State, can embark in enterprises from which good business judgment holds private capital aloof. Although taxes upon private property are clearly felt to be a burden upon business, taxes on public utilities are considered to be merely a new source of revenue to the municipalities." It is estimated that each payer of a five-cent fare in Massachusetts contributes half a cent in taxes, this being a heavy burden for those—wage-earners—who make the greatest use of street cars.

The remainder of Mr. Allen's article deals mainly with the transit conditions of Boston itself, although the true transportation area of that city is not that containing the city's population of 600,000, but the larger territory made up of a score of municipalities with twice that number of people. The construction by the city of the first subway, one and two-thirds miles long, at a cost of about $4,250,000, was followed by its lease to the West End Street Railway Company for twenty years, at an annual rental sufficient to pay the interest on the bonds issued to build it and to provide a sinking fund extinguishing the principal in forty years. This was succeeded, in 1896, by the incorporation of the Boston Elevated Railway Company, which now operates seven miles of road, the two companies working under single management. In addition, a subway under the harbor has been built, this bringing East Boston into the general system; an independent subway is under consideration in Washington street, and plans for connecting Cambridge by a combined subway and elevated road are under consideration.

Mr. Allen takes his readers over interesting ground in reviewing the relations between electric street railways and the steam railroads, the latter having missed, at the start, the opportunity of making the former their feeders. "They opposed their development at every turn, and forced these interurban roads to make alliances among themselves, which, with the inevitable consolidation brought about by natural conditions, resulted in the building up of street railway systems which in certain sections rivaled the steam railroads in extent." Summarizing the general situation in Massachusetts, Mr. Allen writes as follows: "Taken all in all, there is little question but what conditions as they exist to-day in Massachusetts come nearer to an equitable solution of the problems involved than they do in other States. There is no doubt a tendency to overtax the street railway companies at the expense of the people they serve, but this arises from the misconception of the incidence of such taxes. The principle of a perpetual revocable franchise seems absurd, but in practice it works exceedingly well. It holds the companies to good service under penalty of revocation, and yet by the safeguards placed around the revocation it insures the investor reasonable security for his money. The working of this apparently illogical form of franchise is in practice far better than the popular one of limited franchises. Nothing is more disturbing to the systematic, logical development of a system of street transportation than a limited franchise. It is poor business policy to put money into a street transportation plant which, at the end of a short term of years, may be rendered useless by a refusal to renew the grants of location. Good business policy demands that a company possessing a franchise for a street railway system which expires in a short time shall put aside enough from its income to reimburse its stockholders for the money they have ventured in this plan to supply the public with facilities for transportation, so that they may be secured against loss at the expiration of the franchise term. This enforced setting aside of a fund for the payment to the stockholders of the money they have invested hampers the company in many ways. It prevents extensions during the last years of the life of the franchise; causes during the entire life of the franchise the question to be raised whether any given improvement will yield enough to provide a sinking fund and a fair return on the money expended, and forbids any improvement which cannot meet these requirements.

"The problem of street transportation in the United States is of vital importance, and Massachusetts, early in the field, has tried out many of the questions involved. It would be folly to claim that Massachusetts has solved all the complex problems presented by the rapid urban growth of the past twenty years, and the still more rapid growth of suburban localities, but there is no question but that in practice Massachusetts methods have proven themselves sufficiently flexible to meet the rapid growth of urban and interurban street railway conditions as shown in a State distinctly urban in character.

"The question of the municipal operation of street railways has not been seriously considered in Massachusetts, although the special committee of 1897 favored municipal ownership of tracks and private operation, but this has never taken practical shape either in legislation or in

actual practice. It is a large problem to consider—is a municipality justified in spending the money of the taxpayers on a speculative investment, for, considered from the point of the actual results of street railway operation, such an investment must be considered speculative. The Massachusetts plan of protecting the public and the stockholders by rigid supervision by a competent tribunal certainly deserves consideration in all parts of the country, and its actual operation seems to prove its efficiency in that State at least."

The White Pigments, Zinc and Lead, and Their Adulterants *

A GREAT deal is said to-day of the adulteration of food products and drugs. Second only in importance are the frauds practiced in the paint trade. In point of magnitude they surpass the first. White Lead, innocent of a trace of lead, is sold; one sample, bearing a label stating that $1,000 would be paid if the lead in it was not pure, was found to contain no lead whatever.

The labor in painting is from two to four times the cost of the material. It is evident, therefore, that while the use of an adulterated paint works to the advantage of the painter, in that it makes frequent painting necessary, the house owner can ill afford any but the highest grade of materials. Many look only at the first cost, and imagine that a few dollars saved in the cost of the paint is so much money gained. This is due to ignorance.

The white pigments are of the most importance, as they form the basis of most paints and are often used for a first coat. Of these, white lead stands pre-eminent.

An easy test, requiring no chemical skill, is the blow-pipe test. A piece of close-grained charcoal is obtained, and in this a small hole is dug out. A fragment of the white lead, about the size of a small pea, is placed in this hole. With a common jeweller's blow-pipe a jet of flame is directed against the white lead, using the flame of a spirit lamp or a small gas flame. A pure white lead will melt down to a clean button of metallic lead, leaving no residue in the charcoal. The presence of adulterants will prevent this, and instead of getting a button a grayish white moss is obtained.

Another simple test is to treat the dry white lead with diluted nitric acid. If pure, it dissolves completely, with effervescence, to a clear liquid. If a lead in oil or mixed paint is to be examined, the oil should be first extracted by thinning down with benzine. The pigment settles to the bottom, and the benzine carrying the oil may be poured off the top.

To cheapen white lead, barytes, whiting, terra alba, clay, silica, and zinc white are added. The latter, however, is said to be of some advantage, if used in small proportion, as it tends to prevent the chalking of lead. Any or all of these substances may be found in a mixed paint. The prudent buyer will do well to steer clear of mixed paints; he should purchase the proper ingredients and have the mixing done on the premises.

White lead may be bought absolutely pure in paste form, with 10 per cent. of linseed oil. The manufacturers of white lead are not, as a rule, paint manufacturers, and if the lead is bought from the original maker, branded with his mark, there is no danger.

The paste lead is thinned with pure linseed oil; 5 to 10 per cent. of a good light colored drier is added, together with the proper tinting material, and the mixture strained through a sieve before use. No turpentine or benzine is necessary.

An important saving can thus be effected. White lead is sold at a small margin of profit. The same is true of linseed oil, so that one who does his painting in this way is often able to find that he has obtained the best of materials at less than the cost of an adulterated mixed paint, on which the manufacturer nets a large profit.

* Abstract of the first of a series of three lectures on "Analysis and Adulteration of Paints, Oils and Varnishes," given, on Tuesday evenings, before the Polytechnic Institute of Brooklyn, by Consulting Professor Dr. Arthur C. Longmuir.—Lecture of February 20.

The Water Works of Battle Creek, Mich.

A LEAFLET issued by Mr. W. W. Brigden, Superintendent and Civil Engineer, gives some interesting particulars in regard to the operation of these municipally-owned works, supplying a present population of 23,000. The water is derived from Gognac Lake, having an area of 360 acres, supplied by a drainage area 1½ square miles in extent, with a supplementary supply from a drainage area of 14 square miles. Of the 434 million gallons pumped last year, 53 per cent. was paid for by meter, at an average rate of 12.2 cents per thousand gallons, 5 per cent. was unmetered but paid for, 19 per cent. was supplied to parks and public buildings and drinking fountains for horses, while 6 per cent. is put down to leakage, leaving 7½ per cent. accounted for by various uses, including fires, 6½ per cent. ascribed to under-registration of meters, and 3 per cent. allowed for slip of pumps. It is shown that 88 per cent. of the services are metered, these accounting for 53 per cent. of the total volume of water, as above.

A total of $377,168 has been expended on the construction of the works, which include 46.2 miles of main, 393 street valves and 475 public hydrants. There are 3,279 meters, and the result of their extensive adoption is seen in a daily per capita consumption of 52 gallons. The water is lifted to an average height of 115 feet by two Blake compound, duplex, condensing steam pumps, each of 2-million gallons daily capacity. Mr. Brigden solicits an interchange of data.

MAYOR FITZGERALD, OF BOSTON, has signalized his entry upon the duties of his office by cancelling a number of contracts made by Acting-Mayor Whelton in the last days of his service, to which he was called by the sudden death of Mayor Collins, in September. As only one secular day intervened between the signature of these contracts and the assumption of office by an elected chief magistrate, Mayor Fitzgerald no doubt felt sure of public approval of his early action.

MUNICIPAL REVENUES AND EXPENDITURES IN RELATION TO THE CONTROL OF QUASI-PUBLIC ENTERPRISES*

DURING the years 1902 and 1903 I made for Mayor Collins of this city a series of investigations and reports upon the various municipal departments and upon the general financial conditions of Boston.

In these reports it was demonstrated that the municipal expenditures of Boston were much heavier per head of the population than were the expenditures of New York, or any other of ten of the large cities of the country. The ratios of municipal "running expenses," not including interest upon debts, for the census year 1900 in these various cities, was as follows:—Taking Boston at 100 per cent., the ratios per capita were:—New York 91 per cent. of Boston; Philadelphia 46 per cent.; St. Louis 47 per cent.; Buffalo 50 per cent.; Providence 56 per cent.; Chicago, excluding certain city functions, 35 per cent.; and the average annual expenditures of these ten cities was only 41 per cent. of the expenditure of Boston.

These statements were somewhat astonishing and awakened much discussion at the time they were made public by the Mayor. The figures were based upon the bulletins of the United States Department of Labor and were authoritative. Since 1900, however, there has been a very great improvement in the methods of preparing and presenting municipal statistics and when the report of the permanent Bureau of the Census for the past year, 1905, is published we may expect some very interesting comparisons, in which Boston's relative standing may turn our attention forcibly to the matters which I am attempting to treat briefly here.

In one of my reports to Mayor Collins it was stated that the City of Boston was annually increasing its expenditures for municipal purposes entirely out of proportion to its growth of population or of wealth. While in eight years the increased expenditure per capita had been 23 per cent., the increase of assesssed wealth per capita had been only 5¼ per cent. During the same time the increase of net debts of Boston had been 38 per cent.

This report goes in to state: "To prove, as has been done above, that expenditures for operation and maintenance in Boston are excessive, and should be reduced, is not very difficult, but to point out the particular and practical reductions which must be made is quite a different question, while to make the actual reductions, after they are pointed out, will be found to be a still more serious matter. Each of the heads of departments with whom I have conferred appears to believe firmly that there is excessive expenditure in many other departments, but that in his particular department there is urgent necessity for "slightly" increasing the expenditures by the employment of another clerk or two, or for additional office furnishings or repairs. . . .

Fourteen reports, covering as many departments, were submitted to Mayor Collins during 1902 and 1903 and finally published in book form as Document 62 of 1902.

The interesting question now arises: Did the tabulation of the many figures and the deductions therefrom in these reports bring about any appreciable decrease in the relative expenditures of Boston or of any of its departments? The answer must be decidedly, "No, there has been no relative decrease." Even in those departments especially investigated and reported upon in considerable detail, the annual expense to-day is as large as before and in some cases even relatively greater.

What is the reason for this? Was Mayor Collins in earnest in his determination to reduce expenses? He most certainly was in earnest. He evidenced this determination in many vetoes which were unpopular with other divisions of the city government at that time. There is no doubt that General Collins used the material set before him in these reports as a basis for these vetoes and particularly for the vetoes of extravagant loan bills, which otherwise might have been passed. In this way the chief executive compelled attention to economy and in these particulars successfully held down the unnecessary increase of the city's debt.

The question still confronts us, however; why was General Collins unable to reduce, even relatively, the running expenses of the city departments of Boston? Were the great responsibilities of office and the unavoidable attention required to thousands of matters of detail too much for our late mayor, respected and beloved though he was? Are these requirements too great for any man, however able he may be, unless such a man had been trained to city administration for a long series of years, just as burgomasters go through a long apprenticeship in German cities to-day? There is much to be said in the affirmative on this question.

REVENUE VERSUS EXPENDITURE

But to get closer to our immediate subject. If we glace over the field of the municipal executive and particularly over the field of inaugural oratory, we find that there is nothing new in the demand for economical administration of municipal affairs.

The cry for reduced expenses is, in fact, commonplace. Every mayor, newly inaugurated, sets forth the same old statements, possibly in a new way, but each one of them soon finds out, as all his predecessors have found out, that the movement of twentieth century civilization is too much for him, and that the appetite for expenditure, even with extravagance cut out, is inappeasable. New wants, new demands must be met, school expenses, street expenses, police, fire, water, sewers, public health, all are requiring larger and larger disbursements and there will be, apparently, no end to them. Slowly our mayors—

* An address (slightly condensed) by Harvey S. Chase, Public Accountant, Boston, before the Massachusetts Reform Club, February 2, 1906.

business men though they may be—come to the conclusion, if they stay in office long enough to come to any conclusions, that what *must* be had is *increased revenue.* Said Mayor Collins to me in one of our conferences in relation to Boston departments not long before his death: —"Don't talk of cutting down expenses any more, Mr. Chase. Find me some revenue, that's what we require,—additional receipts. Come to me with a report on new sources of revenue, a practicable scheme. We must have more money for current expenses."

Not only are our cities growing in population, but in cost per head of the population, and not only are our debts growing in proportion to the increase of our municipal plant—our capital assets, such as municipal buildings, real estate, schools, sewers, streets and waterworks, an increase which must be expected—but they are growing also, and by no means slowly, on account of this very lack of sufficient revenue.

With expenditures increasing and revenue not keeping up in the same ratio, it necessarily follows that money must be borrowed to pay every day running expenses. A good illustration is the Boston Ferry Department where in recent years the major part of a large loan, intended only for capital expenditure, has been used to pay ordinary expenses. The lack of appropriations from revenue was made up from loans.

There is no justification for such expenditure. It is absolutely unlawful, but it is an illustration of my point that the present is borrowing of the future to pay its daily living expense.

Waste, extravagance, carelessness, graft, they are all present in our municpal management and yet even if we were able to extirpate them the necessity for increased revenues to carry on the ever extending activities of our cities would still be dominant.

Necessity for Increased Revenues

Our early towns had few communal requirements. With growth came the necessity for provisions for public safety, for police, then fire protection, enlargement of public hygiene, public sanitation; ever more brilliant street illumination; vast increases for public education; never-ending demands for public parks, public baths, bathing beaches and gymnasia; and now for model tenements, and the reaching out in all directions for municipal trading, the taking over of quasi-public enterprises, waterworks, gas works, electric works and street railways.

No wonder that our municipal financiers are at their wit's end to discover means wherewith to furnish the "sinews of peace" for these formidable developments. No wonder that our debts are growing out of all recognition and out of all proportion to our population or to our present assessed valuations.

Where shall we turn for the increased revenues? They must be had—that is evident. We cannot forever go on piling up debts against the future. A reckoning day must come. Simply to pay interest charges and to provide for our sinking funds takes from a sixth to a fifth, or even more, of the revenues of many cities. More revenue must be had. Direct taxes cannot furnish it. The expropriation of the increase of land values, due solely to communal growth, may be the remedy—so the friends of "natural taxation" indicate, or it is possible that profits from municipal enterprises, water, gas, street railways, etc., may be our hope.

Public Ownership of Municipal Monopolies?

To me this necessity for enlarged municipal income tends to put a certain firmness of feature into the ever increasing clamor for public ownership of municipal monopolies.

There are arguments against such ownership, strong arguments, and one of the strongest against municipal *operation* of such enterprises has been the evidence of the inefficient and unprofitable nature of municipal management of our present public works.

Compare, in Boston, the administration of our municipal printing plant with the privately managed public service corporations—the Boston Elevated Railway, the Edison Electric Illuminating Company, or the present Consolidated Gas Company.

The practical business efficiency, discipline and success of the latter are formidable examples in comparison with the lamentable inefficiency of the former: In these city departments we find lack of discipline and of *esprit de corps,* utter inattention to financial results and in fact utter ignorance of what are those results, due to the crude, insufficient and wholly outgrown methods of departmental accounting.

The point is well taken that the City of Boston should first show its ability to successfully handle business enterprises by putting its present house in order.

The opponents of municipal ownership may well ask why do we not demonstrate our municipal capability by our administrative methods and by our systems of account in the enterprises which we now control?

Some quotations from the previously mentioned reports to Mayor Collins particularly upon these three "municipal industries" departments of Boston may well be given here.

Report Upon the Boston Municipal Printing Plant

"It is evident that the prospects of success for the municipal printing plant, viewed as a business operation, are discouraging. Here is an experiment in municipal control—a municipal industry—endowed with every advantage, apparently. Ample capital, generous appropriations, plant in excellent physical condition, regular work of the same general character throughout the year, everything favorable for a successful enterprise which should do the city's printing better than by contract, and which should be able to pay as good or better wages while giving shorter hours to the employees. With all this the plant should be able to save money for the city through charges to the other departments which should be less than outside concerns could afford. This was the theory upon which the plant was established, and there was nothing unreasonable about the theory. The plant should have made just such a success in these past years, and it is a humiliating fact, if not a disgraceful one, that the

financial result of these years has been so far below what could have been reasonably expected."

In regard to labor at the plant these statements are made.

"The present hours of labor at the plant are eight per day, with Saturday half-holiday, or forty-four hours per week against fifty-four hours per week by the nine-hour day in outside printing establishments. No one would object to this shortening of hours, on the contrary, all will applaud it, provided only that the city's work be properly done in the forty-four hours remaining. In fact it is reasonable to expect that more work should be done per hour, per man, on a seven and one-third hour day (average) than on a nine-hour day, but this has not been the fact at the printing plant. The figures given prove conclusively that, contrary to reasonable requirements, less work per hour per man has been accomplished at the plant. These results have many causes, some of which were designated in last year's report—but all of which simmer down finally to two fundamental causes. First, incompetent and sometimes useless employees who have been forced upon, or at least accepted by, the Superintendent; and secondly that the necessary vim and snap have not been imparted to the supervision of the work. There has been, and still is, a notable lack of energy in many departments of the printing plant."

Report Upon the Boston Ferry Department

"The City Auditor's report for the fiscal year 1901 states, on page 250, that the total expenditures for the East Boston ferries for the forty-four years since 1858 have been

. . . . .	$8,705,287.15
And the total receipts have been .	5,509,841.90
Loss on ferries . . .	$3,195,445.25

or an average loss of $72,624 per year for the forty-four years. For the past ten years the average loss is given as $102,164 and the past three years the average loss is given as $151,288. It is evident that the losses on account of the ferries are increasing with somewhat alarming rapidity. A careful investigation of the accounts of this division has therefore been made. . . . .

"The gross expense per annum of maintaining the ferries, including interest charges and depreciation, has been nearly equal, on the average, to the whole amount of the tax collections from East Boston, while the net expense of the ferries has been about forty-three per cent. of these collections. That is to say, out of every dollar of taxes collected from East Boston (Wards 1 and 2) ninety-five cents have been paid over immediately for the support and construction of the ferries, while of these ninety-five cents only fifty-two cents have been recovered through the ferry tolls."

Report Upon the Boston Water Department

"The lack of proper methods for handling transactions of such magnitude and, indeed, the general crudeness and looseness of the "capital accounts" in the Water-works' bookkeeping ever since the foundation of the plant are astonishing. No commercial enterprise of this size could long remain solvent with similar negligence upon this (capital) side of its accounts. These deficiencies and neglects are not faults of the bookkeepers, but are faults of the system or rather of the lack of system in these exceedingly important particulars. . . . .

"There has been in the past excessive expenditure for work done through the employment of unnecessary men, by the employment of aged and infirm men, and by other means whereby the costs of work have been heavily increased. The difficulties of reducing the force to the actual requirements of the work are further complicated by the tremendous pressure continuously brought to bear upon the head of a department, similar to the one we are considering, by applicants for positions and their backers. Large numbers of citizens in Boston are "job-mad," as it has been expressed. The eight-hour day and half holiday on Saturday, the certainty of good and constant pay and the moderate amount of work demanded by the city are attractive to a multitude of men, and on this account the head officials in departments like the Street Department are driven nearly to desperation by the appeals, demands, and persistence of the applicants and their backers. Indeed, to escape from this pressure and get time for the real work of the department becomes a matter of great difficulty which seriously interferes with legitimate public business."

Need of Comparative Reports and Uniform Accounting

"The necessity for prompt, clear and exact reports upon what has occurred, and what the costs have been, is fundamental. Publicity is the first step toward a cure for waste, extravagance, and recklessness in municipal expenditures. When the facts are brought out so that the public can understand them through a system of uniform accounting and reporting, which will render accurate comparisons possible, then it will be safe to trust to public opinion to enforce the modifications and improvements which will be thereby shown to be imperative.

"This proposal is the almost self-evident one that Massachusetts, following the lead of Ohio, shall establish a system of uniform municpal accounting and reporting, so designed that the actual expenditures in Boston and in all other cities and towns of the State shall be made public annually and promptly upon uniform tables and schedules which shall be published by the State as an impartial authority. It is the opinion of your examiner that by these means, and by these means only, can the actual facts and figures of municipal revenues and expenditures in all departments and details be ascertained and established beyond dispute. This suggestion can be turned into a practical reality by the introduction and passage in the next legislature of a bill requiring uniform accounting in all municipalities and a uniform system of reports submitted to a central State authority by all the cities and towns in the Commonwealth. If this be done a flood of light will be thrown upon many questions now in dispute. Nearly all cities, for instance, are endeavor-

ing to determine whether "day labor" or "contracts" is, all things considered, the better way to handle public works; whether old age pensions for incapacitated workers may not be a measure of economy as well as substantial justice; whether or not the civil service law as now administered is an effective agent for good government.

"These and many other equally important questions will stand some chance of solution when the facts and figures of all municipalities in the State are established beyond dispute by the State authority and made available in promptly published reports, wherein shall be given comparisons of the results of expenditures in all cities and towns as well as financial statements of the expenditures themselves. That is to say, when accurate comparisons are given of the benefits and conveniences which the citizens of different cities actually receive in return for the taxes which are collected and expended by those cities."

Immediate Necessities

In the light of these facts pertaining to Boston's administration of public industries the argument against immediate municipal operation of still larger and more complicated enterprises in this city would seem to be sufficiently strong.

Our attention needs to be forcibly directed to the lacks and to the failures in our present administration of these utilities. We must reorganize them. We must introduce proper system of accounts and reports. We must become able to get efficient men, engineers, accountants, administrators, for the heads of our municipal departments and we must be able also to *keep* these men after we have obtained them. In this connection I quote from a previous address:

"Suppose the stimulation of competition for credit and honor from the community be added to the present inducements for capable public officials. Suppose by promptly issued comparative reports it should become evident to all that the head of one department has done better than others in his own city or better than those in similar departments in other cities, and suppose that thereby this official's hold upon his office and his hope of future promotion become strong, how will all this help in the Augean task of raising the level of capacity and efficiency in our public service?

"To be commended for good work by his fellow citizens is almost unknown to public officials in these days. We are apt to condemn all public servants together, the good and the bad alike, whenever some unsavory story of municipal politics appears. This injustice should be stopped. There should be discrimination, the capable must be distinguished from the incapable, the prudent from the extravagant, and the incorruptible public servant from the corrupt one. How can this be done except by uniform and comparative public accounting and reporting? How else can these distinctions be made, how otherwise can the capable man be rewarded and the incapable one dismissed? Let the official who does well be shown forth in the results of the administration of his trust; let him receive the honor and the security of office which are due him and we shall never lack for public servants to play the same important parts that honorable and successful men play in private affairs. This is what uniform and comparative public accounting and reporting stands for as I understand it."

Development in the Future

Personally, I believe the time is coming and is not far off when these requirements shall be fulfilled, and when the strength of the present arguments against municipal ownership and even against municipal operation will disappear.

Despite all the examples of municipal corruption and inefficiency, it appears to me that the tide setting in favor of municipal administration of quasi-public enterprises is based on inherent necessity and must ultimately prevail. One compelling reason for such an ultimate result is the tremendously corrupting influence throughout the country of the control of our law making and franchise granting bodies by the beneficiaries of the special privileges granted.

No reference is intended here to conditions in Boston. We are fortunate and should be correspondingly thankful that the same magnitude of this evil does not directly confront Boston, although it is latent, even with us.

The necessity for a return to democratic control of our governments is a sufficiently compelling motive to bring about ultimate public ownership of all privileged municipal monopolies, and further to develop, however slowly, the men and the methods which will make municipal operation of quasi-public enterprises efficient and beneficent.

Meanwhile evolution will go on through the steps of "sliding scales," short term franchises, competitive bidding for public privileges, municipal purchases of plants which will be leased to private operators, etc., etc.

Public *ownership* with private *operation* under reasonably short term leases should be our immediate goal, but, as already stated, municipal operation itself, possibly in the distant future, must inexorably prevail. . . .

Conclusion

If these deductions be true ones, if governmental control of the "activities of industry and production" is inexorable in the evolutionary process and if this development is to come "on its merits" then assuredly we need not fear for such control.

Our duty should be, evidently, to so bestir ourselves that through the introduction of comparative reports based upon uniform systems of accounting, the relative merits of the antagonistic methods of administration may in the future be correctly ascertained. No reform is more important than this one, and the Massachusetts Reform Club may, if it sees fit, take practical steps to assist it by supporting, through a committee or otherwise, the bill for establishing a "Controller of Municipal Returns" which is now before the legislature of Massachusetts.

THE PRACTICAL SIDE OF MOSQUITO EXTERMINATION *

PROBABLY no crusade, which at first seemed so chimerical, ever made such strides as has the mosquito crusade in the last three years or so, until now, that which less than a score of years ago began as an oiling experiment in a summer resort in the Catskills has spread to a crusade of drainage, filling and the like, while oil, indispensable in certain limited conditions, is now largely supplemented by extensive engineering operations, Now, engineers of national reputation are applying the solid foundation laid by scientists to their work and urging broad remedies upon communities and cities sadly injured by the mosquito nuisance.

In a report (1903) on the improvement of a river in New England, an engineer whose abilities have brought him into large projects in many sections of the country makes the mosquito, and hence the malaria question, one of the moving causes for a proposed improvement. He calls to his aid a Harvard pathologist of world-wide reputation, who devotes many pages of this report to the mosquito question.

In 1904, the same engineer reports on the improvement of another river, and gives prime attention to the results of investigations by scientific experts from the Massachusetts Institute of Technology. Based on their reports, he is led to state: "The results of this inquiry were startling. Every physician who was consulted testified that malarial disease was already prevalent and that it was apparently increasing and slowly extending." He adds, "I was thus obliged at the outset to face a great sanitary problem which for the time overshadowed the other studies, for questions of public health are paramount and should have precedence over landscape design and facilities for brick-making or market gardening. . . . . Experts speak of a 700-acre fresh pond marsh section (300 of which is constantly wet and soggy) where "physicians report that every person in every house has had the fever," many of them stating that this is "the most dangerous section in twenty-five miles." While the poor who live in this swampy territory were mostly affected, the report shows the disease spreading into the best hilly district. . . .

The Author, after calling attention to the neglect of architects and engineers to avail themselves of these recent advances in sanitary science, proceeds to cite the case of an owner who, while going to great expense in laying out wide lawns in front of his dwelling, had allowed a breeding place for mosquitoes to remain near by—enough to ruin the pleasure his home should yield him. Another gentleman owning a large estate, who has been encouraged to take up this line of work, informed Mr. Weeks that he considered the question one of the most far-reaching before the people, and stated that the work he had already done had resulted in such improved conditions that he will continue it with vigor for its paying results. A New England fishing village has recently been impressed with the hope that its thousands of acres of breeding grounds might be redeemed, and, to that end, is now engaged in raising public money to carry out radical plans of improvement. The paper then resumes:

I do not need to rehearse similar instances when all know of the transcendent achievement of Dr. Gorgas, both in Havana and in the Panama zone, almost entirely as the result of practical mosquito extermination. Nor do you need to be reminded that the practical work of this kind in New Orleans—first under Dr. Kohnke and others and later by the Federal Government with all its prestige and power, through its Public Health and Marine Hospital Service under Surgeon-General Wyman, with his able corps of specialists all working against the mosquito—brought about the end of the yellow fever scourge this season, without the aid of frost, and has added to the demand that this scourge and its attendant ruinous results to commerce through quarantine be treated solely as a mosquito proposition and not as an inscrutable decree of Providence. I well recall the force with which Dr. Kohnke at the Second Convention of the American Mosquito Extermination Society urged the necessity of screening the cisterns of New Orleans and spoke of his efforts to legally compass this. But his warning was acted on too late. He was then ahead of his time, but we are glad to say he is not now.

The demand is simply: Stop breeding mosquitoes and stop it by practical measures—no chimerical plans—nothing but what a child may comprehend. But do it thoroughly—do it so that results will last. Abolish forever the breeding places and be careful not to make new ones. Communities should put up money as they would to built a fine road—as is often the case, $10,000 a mile through a mosquito-infested section—and do it *before* building the road, and then the road, when built, can answer its full purpose of comfortable travel and traffic.

How much is the quinine bill of the country? And who can estimate, besides, the sum of the misery and loss from malaria? Who will compute how far the loss in a yellow fever epidemic would go to make everything safe along practical, common-sense lines? Is it not a fact that the expense of tardy work and the indirect and direct commercial losses resulting from this season's experience would easily have paid for New Orleans' exemption? How long are we to suffer these evils and pay the enormous and wretched penalty before people will rise and demand that this great crusade shall have complete course. This age is not the time to say that the work is too great. Put one year's loss and the cost of remedies, the country over, into the crusade, and it will be a pay-

* Condensed from a paper read before the American Association for the Advancement of Science, at its New Orleans Convention, Dec. 29, 1905–Jan. 4, 1906, by Henry Clay Weeks, Bay Side, N. Y., Secretary of the American Mosquito Extermination Society.

ing investment financially, not to include other considerations. But again, do it thoroughly, so that you will not have to come back again in another year, or in ten years, for more money. Otherwise you have set back the cause for years. Note the radical work which the Federal Government is doing in Panama and which it considers necessary in every way before work is fully put under way. We said a year ago that the Government could well spend a million dollars to make the zone safe. That has been spent already and results will justify the outlay and many times as much more. Chairman Shonts of the Isthmian Commission, in an address last month, expressed the well-grounded hope that yellow fever, that supreme terror of the tropics, was extirpated—never to return again to Panama. Can one conceive all that such a statement means in relation to the cost and humanity of this great work?

Assistant-Surgeon-General Gorgas, in his report dated November 9th, 1905, reports that of the 22,000 employees during October, of which 4,000 were non-immunes, there was but one case of yellow fever and no deaths. He pertinently contrasts conditions for the same month in the zone now and under the French *regime,* before the mosquito theory was known. Then, there were reported twenty-one deaths and eighty-four cases, and many of each were not reported. Now, he has care of one-third more non-immunes and there is only one case. He maintains that "the results are solely and entirely due to the sanitary measures put in force." He has an *Anopheles* brigade reporting thousands of feet of ditches dug and cleared and other remedial work; and a *Stegomyia* brigade reporting and remedying tanks, cisterns, barrels and other breeding places. To overcome the dangers from these pests which get to wing, he has a fumigating brigade, reporting houses fumigated containing 12,000,000 cubic feet, using 18,000 pounds of pyrethrum and 7,800 pounds of sulphur. Dr. Gorgas finds a steady decrease in cases of yellow fever under this work while there is a steady increase in the number of persons susceptible. He considers the sanitary question in Panama settled—that the largest necessary force of laborers can work there without suffering from yellow fever and that "the general health can be kept as good as if they were digging a canal in the healthy part of Maryland." Now all this you may hear stated by others, but bear in mind it is the practical side of mosquito extermination we are trying to emphasize, and this is all practical and highly profitable in every way and bears well to be repeated. Also recognize that, to some extent, such work is necessary in many communities in the States, and that it is just as profitable here in a humanitarian view, as a financial proposition, and in other aspects.

No progressive man will object that the Federal Government is spending hundreds of millions on good roads, or irrigation, or river and harbor improvement; that the Empire State votes 150 millions for good roads and canals; but when it is considered that in some of these cases the benefit will come only to sparsely settled sections and results in aiding comparatively limited areas and valuations, the thought arises, why should not some of these vast sums be used in blessing the country by driving out the mosquito and malaria and yellow fever, bettering the condition of the less favored people—for they suffer most—changing marsh and swamp areas into places of fertility and beauty and oftentimes into places of pleasant habitation. When it is considered that such work is largely needed in close centers of population, where thousands will be benefited instead of scores, and where the resultant increase of tax valuations will shortly entirely repay the cost, the urgency of the subject as a public work is manifest. This body and all others working for the general good should state and reiterate this position until we get public action.

It has taken some years to get strength enough in the idea to obtain appropriations, but these are now coming in many places. Numbers of cities and communities are awakening and acting. The Department of Health of the City of New York has been expending this season in one Borough—Richmond—an appropriation of $17,000 under Dr. A. H. Doty, the health officer of the port, and it is to be hoped that the results will encourage work in other Boroughs. But all public work particularly, we repeat, should be done most thoroughly or the press and the people will raise such opposition as to cause a set-back in the practical work of a thoroughly scientific problem.

The city of New York is also helpfully acting in the reform by utilizing part of its inorganic waste in filling in breeding places instead of carrying it out to sea and dumping it so that much floats back onto adjacent shores. In the southern part of the Borough of Brooklyn, Coney Island Creek is being filled in, which, if guardedly done, will prevent its waters from saturating hundreds of acres of marsh land where mosquitoes are now famous. This evil and this benefit were pointed out some seasons ago when a crusade was initiated there by the late Mr. Wm. C. Whitney.

Some two or three years ago we were greatly encouraged in learning that the Italian Government had made a contract with some German capitalists to drain the great marshes about Rome—to destroy the breeding places of mosquitoes and thus render the section healthy and inhabitable. But it seems that this great improvement and blessing to a race has been kept back until now by the obstruction of a few sporting noblemen (in title) who wished to have the marshes left for their personal pleasure. Now the press informs us that the work is to go forward—the promoters to be paid in hitherto worthless land. What a suggestion for our country along lines of marsh improvement and the obstruction met from the personal interests of a few seeking pleasure.

The great benefits of mosquito extermination, we feel, are to be accomplished by a careful education of the public mind and a judicious effort for laws and public appropriations, by co-operation of General and State governments, of cities and rural sections, of individuals and public men in a short, strenuous campaign. What need of taking decades in these moving times? And it is on these lines that the American Mosquito Extermination Society is earnestly working, and I bespeak for it your influence and co-operation.

It would take too much of your time to speak of this phase—the basal work, education—education of the public school children of the country, the law makers, the editors and press writers, the civic organizations, the professions interested, the great mass of the people. But this work our Society is striving to do and has its members distributed well over America, to whom our literature is scattered and from whom we frequently hear of its bearing good fruit in campaigns. In our Society, either as officers or on the Advisory Boards, are many men of broad influence in the country. Among these the earliest to go into the movement, inspired by the entomologist before referred to, were Matheson, Kerr, Miller, Hoyt, Cravath, Rand and Wetmore—business men of largest arfairs.

We have got such men together, with many others known over the world, into a Society, which, according to its constitution, seeks "to unite in a general body persons believing in the various great evils resulting from the unrestrained breeding of mosquitoes in civilized sections and in the practicability of their extermination therefrom, by private and public systematic operations."

The Civic Movement

In the course of an address delivered January 9 before the Nashville, Tenn., Press Club, Judge Robert Ewing drew attention to the increasing tendency of the people towards the cities, disclaiming any desire, however, to enter on the question whether this is altogether a thing to be desired. Taking the broad fact that this movement is brought about by the people's hope and expectation of bettering their condition, the speaker urged that they, at least, should not meet with disappointment, for "it is to the interest of the State that its citizens, wherever they shall place themselves, shall advance; that each succeeding generation shall be better educated and accomplish something towards putting life on a higher plane. It therefore behooves the State to see that these collections of its citizens are favored, as far as can be, by the enactment of laws embodying a wise system for their self-government—a form which will secure to the individual citizen all of personal freedom of action, consistent with the rights of others, and also provide for all the best means for obtaining health, comfort and happiness."

Practically, he went on to say, it rests with the citizens themselves to say what form of government they shall enjoy. "It is, therefore, the first duty of these inhabitants of cities to consider carefully and clearly determine on what they want; the second, to elect representatives who will secure this for them, and last and highest of all, to choose, from among their number, men of pronounced character who will truly and faithfully obey the spirit as well as the letter of these laws."

Emphasis was laid upon the duty of citizens to meet their obligations as such, as in taking their part in elections. In this connection he quoted from a recent paper, by ex-President Cleveland, on the integrity of American character, in which reference was made to "the indifference of a vast number of our decent and otherwise patriotic people to political movements and their consequent neglect of duty as voting citizens." For himself, Judge Ewing observed that it had always been a mystery to him "how large property holders in a municipality could, in selfish justice to themselves, refrain from taking an active part and interest in municipal affairs. So many questions of deep concern to them are constantlv arising. The net returns from their property and its consequent market value often depend on whether good or bad city officials are at the helm. Two-thirds of the taxes paid are for municipal purposes. It behooves them to have these taxes kept at a reasonable rate, on a reasonable assessment, and to see that they are expended in a judicious way. The health and personal comfort of their families often depend on this. They are concerned that bonds shall not be unwisely or recklessly issued, for nothing is truer than that a municipal debt is a municipal mortgage, and unless adequate returns are received, these property owners are the sufferers. They are equally interested that franchises of great value shall not be frittered away—for some municipal franchises are in themselves far more valuable than the implements used in their exercise. These, and a thousand other things, are of interest to them, and yet, as the time approaches for choosing officials who are to administer on their affairs, they remain perfectly quiescent. The sleepless ones, who are to do the administering, quietly arrange mattters. The night of the primary arrives, and if these property holders go at all, they go but to find everything arranged, and the only thing left for them to do is to choose between two men—neither of whom would they employ in their more immediate affairs, and neither of whom do they deem at all suited to properly discharge the important duties sure to devolve on them. These duties are really important. The proper management of the financial affairs of a great city—the enactment of wise ordinances, securing proper protection to the lives and property of citizens—the preservation of order, the judicious expenditure of the yearly revenues in securing those things necessary for the comfort and well-being of citizens, the proper control of corporate bodies, the wise encouragement of legitimate business, and suppression of that conducted in violation of law, the suitable education of children, fitting them for good citizenship—are among these duties, and their proper performance would seem to require no mean order of talent. Why the importance and dignity of these offices is so undervalued I am at a loss to understand."

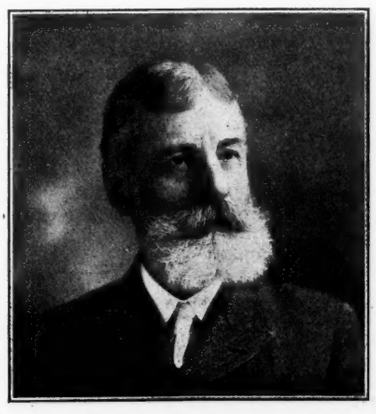
Referring to the local situation, the Judge favors a return to the original charter which provided for the election of councilmen by the city at large.

"I thought then," he said, "and still think, that this was a wise provision—mainly for the reasons that in this way better men were likely to be chosen, and that, chosen in this way, these men would take a broader view of affairs and be more inclined to legislate for the general good

than would men elected from special wards. Not representing any special locality, they would not be constantly hampered in their views of the general good by the desire to have an undue part of the revenues spent in their bailiwick—whether, wisely or unwisely. They had no temptation to break over charter bounds and insist on originating work. They did not lend a listless ear to recommendations for general expenditures for the general good, because of a desire to save these funds for ward improvements. They could, in an unprejudiced, unimpassioned way, pass on the merit of any suggested improvement made by that Board to whom suggestions were committed."

This charter vested the real power in the Council, which controlled all expenditures of money. Its power was, however, restricted to some extent by a Board of Public Works and Affairs, consisting of three members chosen by the Council. "Possession of desirable business traits does not always go hand-in-hand with personal popularity," hence, "a small body of men can more certainly ascertain whether candidates for the Board possess the desired qualities." Members of the Board so selected were paid and were prohibited from engaging in any other business. The duty of the Board was to consider plans and to originate work; the Council, however, was not obliged to concur in its recommendations.

Subsequent to the adoption of the charter, amendments were made which nullified the spirit of the original document—the creation of a Civil Service Commisssion has taken away from the Board the control of the business department—city employees have become in a sense officers and, as such, cannot be removed without charges preferred. Civil Service Commissioners have their own business to look after and are thus not in a position to judge of the efficiency of employees. "I may be prejudiced," the Judge went on to say, "but if I were asked what should be done to give Nashville a good form of government I should unhesitatingly say that, with a few changes such as experience has shown desirable, we had better return at once to a charter which was, I think, a happily conceived and wise instrument, the result of the best thought of distinguished, able and patriotic citizens, who, without hope of other reward, sought alone the common good of all."



HON. C. H. GAUS, MAYOR OF ALBANY, N. Y.

Caisson Disease

THE effects of compressed air on tunnel workers and the palliative measures to be adopted by those in charge, formed the subject of a lecture by Prof. Thos. Oliver, M.A., M.D., recently delivered before the British Royal Institute of Public Health. The author described the caisson used in such work as a strong box or casing which is allowed to sink below the surface of a body of water in order to carry on work therein. As the caisson has no bottom, its edges cut into the soil where it rests, sinking lower as the material excavated within is hauled to the surface and disposed of. To keep out the water, air has to be pumped in at a pressure varying with the depth of water.

To allow the passage of material and men, what is known as an air-lock is provided at the top of the caisson, partly above water, so that access can be had to the working chamber while the pressure is maintained.

On descending into the lock, very little inconvenience is experienced by men accustomed to the work; they have a way of swallowing air and diverting some of it to the eustachian tube, thus avoiding injury to the ear. Once inside the caisson, very little inconvenience is felt, but loud conversation is difficult. Although it has been found advisable to limit the working period to a few hours, a man can do as much work in a given time as under ordinary conditions. It is during "decompression," on leaving the compressed atmosphere, that abnormal symptoms develop. In minor cases, men suffer from pains all over the body, and bleeding from the nose, or even from the mouth and ears. In severer cases, paralysis develops.

There are certain predisposing causes of this illness, among these being an insufficient supply of fresh air or the contamination of air by lamps or by gases emanating from the materials being excavated. Severe manual exertion is a predisposing cause, the men who guide buckets as they are hoisted not being subject to the disease.

When the decompressing process is carried on slowly, Nature allows the excess of gases to escape through the lungs. The red corpuscles of the blood carry carbonic acid gas, a waste product of the tissues, to the lungs. Interference with this process and disturbance of the equilibrium between internal gases and the atmosphere are, in Prof. Oliver's opinion, the cause of caisson disease.

Since immunity from this malady among laborers will allow engineers to carry on public works requiring deeper foundations than hitherto attempted, preventive measures are of the utmost practical importance. Slow decompression, with recompression if any of the symptoms of the disease appear, is the chief preventive. Breathing an atmosphere of oxygen for five minutes before coming out of the caisson, by driving excess of nitrogen out of the blood, has been found to have a beneficial effect. In general, medical inspection and the use of every facility for the comfort and treatment of men on coming out of the caisson are advised.

SAN FRANCISCO, CAL., is threatened with a strike of garbage men, who are dissatisfied with the methods employed at the reduction works.

WATER PURIFICATION AT ST. LOUIS

The Method Described in a Medical Report to the Nashville Board of Health

THE Nashville, Tenn., Board of Health, in seeking a plan of water purification for the city, has obtained a report from Dr. J. R. Buist, of Nashville, on the method adopted for the purification of Mississippi river water at St. Louis. Dr. Buist describes this as a departure from the ordinary practice of such prominent sanitary engineers as Fuller, Hazen and Maignen, and fears that the method may not be indorsed by them. Previous to the adoption of this plan, the city of St. Louis had had estimates of other methods of purification which would have involved an expenditure of some twenty million dollars. Dr. Buist points out that the cost incurred by St. Louis to obtain an improved supply has been merely nominal, and proceeds thus:—"It is the fact that she already had installed very costly pumping stations, receiving basins, reservoirs, and everything pertaining to a big and expensive plant; that it is a piece of good fortune that the location and construction of the old plant made it easily convertible to the needs of the new process. The important alterations and additions required some $10,000 in the mixing house and about $20,000 in changing the settling basins.

"I learned from the city officials, as well as from a number of citizens, that St. Louis was satisfied and really greatly pleased with the radical improvement of the quality of the drinking water provided by the city; that the method had greatly exceeded the anticipations of those who had designed it, and that the unanimous opinion of all persons was that no alteration or improvement could be or need be instituted.

"Through the courtesy of Mr. Adkins, the Chief Water Commissioner, I was placed in the charge of Mr. E. E. Wall, his assistant, who devoted himself for nearly a half day showing me around the entire plant and demonstrating very clearly every step in the process. So simple is the mode of operation and so little need of scientific experts in controlling the details that I was amazed. After watching and getting in mind the plan as a whole, with all its component parts, I came to the conclusion that it was one of the greatest achievements of applied science that had occurred in solving the problem of purifying water. The chemical principle involved is that the addition of two differently constituted substances added in a certain order to the raw water act upon each other immediately, by virtue of their well-known chemical affinities; that in this action and reaction the ingredients of the raw water take part, and that the resulting products are an insoluble compound, combining all the organic ingredients, mud, and bacteria, and which, by reason of their high specific gravity, are immediately precipitated to the floor of the basin. The beauty of this process is that you can see chemical action going on in the water in the basin. The changing in the color, as well as the chemical action and reaction, are visible to the eye, and, as you watch the basins, you see the gradual shading from muddy, raw water to a perfectly clarified one. . . .

"The construction of the old cistern was this: A crib out in the middle of the Mississippi River, built down below the river bed into a tunnel ten or twelve feet in diameter; through this crib the river water is let down, and passes to a pump some two hundred yards from the river bank. The water is then pumped into a basin near by, covering six or eight acres, and, after settling, is carried through an aqueduct four miles down toward the city to the Bissell pumping station. The addition to the old plant consists of a frame house erected over the tunnel, about midway between the river bank and the first pumping station; this is used for the storage of copperas and lime and for dissolving the former and the mixing of the latter to produce the milk of lime. This is all done by ordinary laborers in a room 20 ft. x 30 ft. There is a wooden tank 5 ft. x 5 ft. x 5 ft., perforated in the bottom, through which perforations one and one-half inch iron pipes project eight inches, and are perforated all around, through which raw water is forced, and the outlet is so regulated that the volume of contained water is changed every five minutes. Into this water a man empties a certain amount of sulphate of iron (copperas) every five minutes. The proportion of iron varies somewhat, according to the turbidity of the raw water, being from one to two and one-half grains per gallon of the whole amount of raw water placed in a settling basin. This solution of sulphate of iron runs from the mixing tank directly down to the supply tunnel and goes to the pumps.

"The quicklime is mixed in covered tanks in the same room, but with hot water, the estimated amount being usually from four to six grains per gallon. This makes the milk of lime, which, during the mixture, is violently agitated and then carried in a pipe across to the power house to be emptied into a well some 30 x 40 x 50 feet. The supply of lime is graduated automatically, while at the same time three twenty-inch pipes pour their contents into this well, being the raw water already mixed with the sulphate of iron. The force with which this water falls into this cistern is such as to keep up a perpetual agitation, and it looks like a seething caldron. The chemical reaction begins in this cistern, which is only twenty yards from the receiving basin. From this cistern the water flows in an underground canal along the basins, the old basin having been divided into six compartments by concrete walls of varying heights. A gate is placed in a canal opposite each compartment. At present the mixed water flows down to the farthest compartment and rushes in against baffles which turn it to the most distant side of

their basin. By this time the color of the water has changed perceptibly. Looking down into the basin, you see an active chemical change taking place, seemingly a fine effervescence going on. As the water gets to the far end of the basin, the color has faded, as it overflows into the next basin the color is still less, until, when it reaches the fifth compartment, it is clear; and from this it rolls over the dividing wall into the sixth compartment, and is thereby thoroughly ærated. From the sixth compartment it is conducted by a covered aqueduct to the Bissell station, four miles nearer the city. . . .

"Now, as to what is known as the "efficiency" of the method—that is, how many of the bacteria are removed and how free from disease-producing germs is the water when it reaches the taps? In the first place, it is well known that any raw water sufficiently muddy can be considered freed of its bacteria when, with the aid of any coagulant, the precipitation of organic particles takes place rapidly or when it passes through a sand filter. In neither case are the bacteria destroyed, but they become entangled in the precipitate or in the gelatinous film over the surface of the filter, and thus the bacteriological efficiency of the process is accomplished.

"Of course, at the St. Louis plant, the process is directed by the Water Commissioner and his assistant, and the City Chemist and Bacteriologist also makes examination of raw and purified water. This is a daily work.

"I examined the printed records in the offices of these experts. The recorded efficiency compares favorably with the best results of any of the costly plants—such as Philadelphia, Washington, and Louisville; in fact, it is better, varying from 96 to 100. . . . .

"The economy under this new process is one of its highest claims to the public confidence. The purification of the raw water proper, outside of the original cost of the tunnels, engines, pumps, etc., has added about $3.64 per million gallons to the cost of the work.

"This is in contrast to the mechanical filtration method as given, I think, by Mr. Hazen—something like $7 per million gallons.

"According to a very close observation that I have kept on what are known as the great water purifying plants of this country, they are open to two objections—one is their extreme costliness for small cities; the other is that they are in reality laboratory works on an extended scale, that they require a corps of bacteriological and chemical experts for their management and maintenance. Therefore, I am persuaded, with all due respect to the great sanitary engineers of the country, that something simpler, more practical, and more economical is what we need to give us that valuable consideration—purified, pure, healthful water."

Dr. Buist believes that this method of purification could be applied to the Cumberland River water used at Nashville and that the special devices required could be added to the present plant without any great outlay.

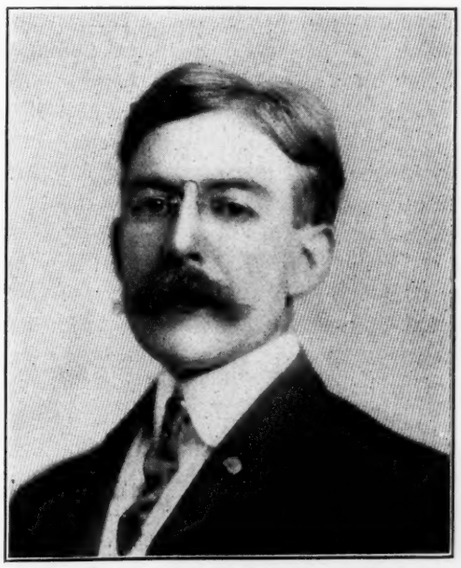
HAVERHILL, MASS., is offered 60-candle power incandescent electric lamps at $21 per year and Welsbach gas lights at $18.10.

Chicago Capitalization Figures

SPEAKING before the League of Michigan Municipalities at Grand Rapids, February 22, Mayor Edward F. Dunne of Chicago made the following statement in regard to the capital of public utility corporations in that city:

"The public utility corporations of Chicago, including the traction companies, the tunnel companies, telephone, electric light and gas companies of the city, are stocked and bonded for about $395,000,000, $170,000,000 of this tremendous aggregate being bonds and the remaining $225,000,000 being stocks. There are 2,000,000 people in Chicago. Dividing this $225,000,000 worth of stock among these 2,000,000 people would give $112.50 worth of stock to each man, woman and child in the city. If this same proportion were carried out among the 80,000,000 people of the United States there would be at least $9,000,000,000 worth of stocks now held by stockholders of public utility corporations in the United States.

"The tremendous accumulations of capital behind the public utility corporations of Chicago have tremendous power. That power will be exerted in many dangerous and formidable ways. It will be used to bring about dissension among the friends of municipal ownership as to plans and methods. It will be used at the polls. It will be used in dragging across the path of municipal ownership the red herrings of immaterial issues. It will be used to discredit the Mayor and aldermen friendly to municipal ownership in every possible and conceivable manner. It will be used in the raising of false issues and false cries. It will masquerade in every possible disguise. It will be used in obstinate and protracted litigation. It will be used in attempting to discredit the securities which will be issued for the raising of money. It will retard, if it is possible, the early realization of the people's project, but it cannot succeed in defeating the early accomplishing of the people's aims and ambitions."



HON. MARK M. FAGAN, MAYOR OF JERSEY CITY, N. J.

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NEW YORK, MARCH 7, 1906

The Price of Gas in New York

The decision of the State Commission of Gas and Electricity to order a reduction in the price of gas in New York City from $1.00 to 80 cents per thousand naturally suggests doubts as to the reasonableness of powers thus assumed and acted upon without reference to the wishes of the producers. On the face of it, the operation of a sliding scale, even where its factors may have been originally determined by a Commission, appears to offer a less drastic solution of the problem than a direct order, liable to be arbitrarily varied at some future time, based upon testimony dissented from by the companies concerned. The beneficial operation of such a scale in Great Britain is emphasized in the recent report of a Massachusetts investigating body, referred to on page 174 of our issue of February 21, but in the absence of any agreement in regard to the establishment of such a basis in New York State nothing was perhaps open to the Commission but to determine a rate, as has been done.

In these circumstances, it is perhaps as well that the customary reticence as to reasons has been departed from by Chairman F. E. Gunnison of the Commission, who states that the actual cost of production by the Consolidated Gas Company has been shown to be 60.75 cents per thousand cubic feet. This covers not only the actual repairs and replacements for the year ended October 31, 1905, but an additional sum sufficient to bring these items up to the annual average for twenty years past. Some thought of a sliding scale is suggested as having been present in the minds of the Commissioners by the statement that they regarded 8 per cent. per annum as a reasonable return upon the actual value of the property owned by the company and used in the manufacture and distribution of gas. This, it further appears, does not exceed $30,000,000, while a total of $80,000,000 capital stock has been issued, together with bonds and convertible debentures bringing up the nominal value to no less than $101,245,000—a contrast suggestive rather of water than of gas.

An important matter referred to in this illuminaitng statement is the contention of the company that the value of its franchise, assessed for taxation by the State Board of Tax Commissioners at $7,781,000, should be counted as part of the actual value of the plant. The Commission takes the liberty of doubting, on the evidence before it, the possession by the company of franchises of any considerable value, and proceeds to lay down the principle, applicable far beyond the limits of New York State, "that these franchises, granted by the people without compensation, should not be capitalized against the public, thereby compelling the public to pay a profit upon the favor granted by it." And, anticipating the objection as to the imposition of taxation upon an item thus regarded and treated, the Commission brushes aside "the seeming injustice" as "sophistical, not real. The franchise tax is paid by the corporation, but charged against the public as an expense of operation, and in reality is therefore paid by the consumer, not by the company."

A similar determination against any rulings tending to augment the value of gas plants as a basis for reasonable dividend is shown in the Commission's decision not to permit this in the case of heavy expenditures now being incurred by the Astoria Company in building a tunnel, under the East River, connecting the Consolidated plant with its own. "The Commission believes that the prospective economies in the cost of manufacture and the increase in the sales of gas by reason of the reduction in price will enable the company to pay a reasonable return on any necessary investment in Astoria." Here, again, the words "sliding scale" were evidently prominent in the Commissioners' field of vision, for it is one of that system's principal merits that reductions in price, while directly benefiting the consumer, yield a corresponding advantage to the producer in stimulating consumption and thereby distributing dead-weight charges over a larger output. We feel that the area involved is to be congratulated upon the possession of a body which has known how to take occasion by the hand and, while perhaps feeling itself debarred from the imposition of the British system, has given those concerned a practical and acceptable realization of its benefits.

A Philadelphia Scandal Revived

We have referred, on various occasions, to the revelations made in the course of Mayor Weaver's investigation of city departments in Philadelphia, and had hoped that the recent acquittal of Chief Engineer Hill, under a ruling of the court before which he was tried, might be accepted as an indication that the worst was already known, so far, at least, as the Water Department was concerned. But the report of the three eminent engineers to whom the examination of the Torresdale conduit was confided some months ago reveals a condition of affairs tending to modify the hopefulness and satisfaction aroused by that decision.

The construction of this large work was carried on under a contract and specification whose terms were unusually and specially stringent in regard to the class of work demanded and agreed upon between the parties. Nothing, for instance, could be less equivocal than the following extracts from section 7 of the general specification: "It is the intention of the plans and specifications to produce a watertight lining to all portions of the work. The contractor will be held responsible for the watertightness of the whole work. If it is necessary, in addition to what is shown on the plans and described in the specifications, to provide any other materials or labor to accomplish these purposes, he shall furnish such additional materials or labor without increased cost to the city." It is surely bad enough that, in spite of these provisions, the conduit is found to leak to the extent of 1,500,000 gallons per day, but one's astonishment increases on finding that over $85,000 was paid to the contractor for extra work, in the effort to make a watertight job. Of this sum, nearly $76,000 was expended on extra concrete and tunnel excavation, in distinct violation of the following clause of the specification: "Where rock has been excavated outside of prescribed lines, from whatever cause, the voids between the brick masonry and the sides of the excavation must be thoroughly filled with concrete, making the work watertight. No additional compensation will be allowed for the rock removed or the concrete filling of voids."

The question naturally arises, in the face of these manifest contradictions, on whose authority the excess amounts were paid and under what power or warrant work of this defective character was taken over for the city? With Mr. Hill completely exonerated by the court, there remains only the conclusion that the element of corruption had penetrated the city departments to an extent perhaps yet to be fully realized in spite of all that was hitherto known to make the Quaker City *facile princeps* in this respect. Perhaps the full significance of the defects now revealed may best be gleaned from the fact that the reporting engineers, in recommending that the city take in hand the work of making the tunnel watertight, refer to the cost involved as probably a heavy item, though not sufficiently so to justify the abandonment of a structure for which the contractor alone was paid $1,321,000.

A British Extravagance

It is among the anomalies presenting themselves in recent municipal developments that a country like Great Britain, whose inhabitants have been reared in a belief in individualism as opposed to collectivism, should lead the way in a movement tending towards the subversion of so vital a feature of the national being. While Americans realize, to some extent, the existence in that country of an undercurrent of well-informed opposition to the British municipalization idea, the facts in regard to a recent legal decision bearing thereon will probably come to many as a revelation of its existence and to others as a justification therefor.

Manchester, a city well known as possessing a successfully operated system of municipal street car lines, was sued by Messrs. Sutton & Co., doing a large business as carriers, on the ground of illegal interference with their trading operations by the establishment of a parcels collecting and delivery service. The city had spent a large sum on plant, vans and horses, and had engaged numerous agents and servants with a view to carrying on this business, the outlay being debited to its street railway undertaking. The judge before whom Messrs. Sutton carried their case, asking for a declaration from him that the city was acting beyond its powers, had no difficulty in issuing an injunction debarring the city from embarking upon any business of that sort beyond the limits of the street cars and calling upon it to pay one-half of the plaintiff's costs. But the matter will probably not end there, for it is open to the city to apply to Parliament for special legislation enabling it to do what it is precluded from doing under existing Acts, thus confronting Messrs. Sutton and others with a powerful rival in the conduct of business undertakings in which large sums have been invested.

The considerations arising out of this contingency are well put by our London contemporary, *Engineering*, in its issue of February 9. "The case is not only of interest to those immediately affected; it emphasizes the importance of a strict watch being kept upon the doings of local authorities. The craze for municipal trading has extended the operations of these bodies into severe competition with the interests of private persons. The local authority is enabled to carry on its business under circumstances much more favorable than those in which the private trader is placed. The fact that they may administer large funds without any close scrutiny on the part of those who have subscribed to those funds, the apathy of the ratepayers, and the protection which is afforded to local authorities by certain Acts of Parliament—all these things tend to favor municipal as against private trading."

American City Government

The following extract from an address delivered at the recent banquet of the Worcester, Mass., Merchants' Association, by Mr. A. P. Cristy, Editor of the local *Telegram*, is but one indication out of many of the extent to which the weak point of American government is being realized by thinking citizens:

"The greatest present American need is improvement in the government of our cities. Evidences abound that the country realizes this and is aroused. The necessity is broader than party lines. You represent all political parties. The time has come when for public and commercial reasons more attention must be given by business men to the makeup of our city government, more attention to their acts. Whatever your political party, you can help Worcester by demanding the nomination of larger men to the city council, by frowning upon candidates who proclaim that they are not in politics for their health. If taxes are high, if appropriations are in part made by incompetent men, if some appropriations are but the vehicle to take away the money of one man and give it as an unearned gratuity to another man, to pay for votes; if the city debt steadily rises until one-third of the annual tax

levy is required to pay the interest on the funded debt and upon temporary loans, manufacturers will not locate in Worcester, and those now here will shade their activities. Labor will not be so largely employed; your trade will not increase, nor will it have that snap which your interests require. The creation of a healthy, vigorous civic sentiment by your aggressive action is a business necessity."

That there is room for both realization and amendment on these lines was strikingly shown by Census Director North at the recent Washington conference of comptrollers, auditors, treasurers and other city officials. According to this authority, the 175 cities of the United States having a population of 30,000 or over are the most expensively and least efficiently governed cities in the world. They annually collect and disburse $765,000,000—more than the annual cost of all the State governments and more than that of the National government—and have accumulated a bonded or funded indebtedness of $1,500,000 (proper deductions being made for sinking fund assets), which is being added to at the rate of something like $150,000,000 a year. In Mr. North's opinion, the lack of uniformity in municipal bookkeeping must give place to a system in which classification of accounts, with a reasonable approach to a single method, is a leading feature, the idea evidently being that only in this way can valid comparisons be made between the expenditures of different cities as a first step towards the checking of extravagance where this is suspected. As a permanent organization of these officials has been effected, tangible results may be confidently looked for, assuming that their efforts will be adequately backed by city authorities throughout the length and breadth of the country.

The Hygienic Evils of Dust

The Medical Record (New York, February 3) reproduces a paper on "Clean Air," by T. Mitchell Prudden, M.D., in which the care devoted to public water supplies is contrasted with the negligence which leaves "the air, which we are ceaselessly taking into the most delicate of our organs. . . . almost wholly unguarded either by public supervision or private attention against wilful or careless pollution by the filthy, the vulgar, and the diseased." Referring to certain out-of-door conditions in New York, the paper proceeds:

"An examination of the sanitary conditions in the subway is now being made by Dr. Soper for the Rapid Transit Commission, the result of which we may wisely await. Already many most interesting and significant facts have been brought to light. It is to be hoped that the Commission will realize the far-reaching importance of this research and see that it is carried to completion, so that we may definitely know in the future what to do and what not to do in the construction and administration of these important avenues of transportation.

"But the stairways and platforms of the elevated railway have now, for many years, been swept with gross disregard of the welfare of its patrons, who are forced to breathe clouds of the most filthy dust when the attendants are sweeping. No public protest seems to be of avail with those responsible for this abomination. When the porters of the system feel like sprinkling the floor and stairs before sweeping, they do so; when they see fit, they omit it. Individual protest to the Company meets with courteous response and the dry sweeping goes on just the same. The Department of Health has long been aware of this nuisance and danger. It has the power to stop it, but does not do so.

"There was a time in New York when the street sweepers were required to sprinkle the pavement in advance of their brooms. But of late we are forced to lend to the Street Cleaning Department the good offices of our respiratory mucous membranes already overtaxed by the requirements of the theatre man, the storekeeper, and the trolley car folks, by the traditions of domestic service, and by the house committees of our clubs."

The Improvement of River Banks

In the course of a discussion on "Civic Improvement from an Artistic Standpoint," at the banquet given by the Architectural League of New York to the Architectural League of America, February 2, 1906, Mr. Frank Miles Day, of Philadelphia, discoursed at some length on the wonderful movement in America within the last five years in favor of making our cities better and more beautiful. Referring to the improvement of river banks, his remarks, as reported by *The American Architect,* included the following:

"No city in America has yet treated its river as it ought to be treated. I venture to predict that within the next twenty-five years the problem will be a burning one, and that many cities will have made a good beginning on the betterment of their river banks. We are just now merely on the outskirts of the movement. Few cities have heard of the movement, but those which have heard of it are beginning to take a lively interest in it. One reason for this is that nearly all cities have a river, and in spite of themselves they have got to treat it one way or another. Some facetious person has said that Nature has so curiously constructed things that she caused a river to run through each important city.

"The problem of the river banks has three characteristics. In the first place they have a naturally wild character; inevitably beautiful until man spoils it. Then comes the city; then we get the familiar aspect of the river meandering through its mud banks, its sides affording a resting place for marble yards, abattoirs, innumerable offensive manufacturing establishments and all sorts of hideous things; a condition which I venture to think is temporary. And then we have the thing after it is finished, an example of which we unfortunately cannot see anywhere in this country; of a river properly regulated, well embanked, with a dignified city coming up to the edge of it, with a splendid tree-line, a boulevard, dignified buildings, all treated in the way a city demands. . . .

"And now, for a moment, to go away from the question of the beauty that ought to be created. Let us think of the thing from a financial point of view. What is more

retardant of land values than a slimy river bank? Think of the things in the neighborhood of it! Think of the low value of the land! Think of the space, for one-eighth of a mile back on each side of the river as a rule, given up to slums! given up to old buildings, and old sheds of no value! given up to half-used wharves! What we want is to embank the river, to bring out a fine class of buildings to the very river's edge, and to enhance five-fold the value of real estate, and increase ten-fold the amount of the taxes received from that portion of the city, and there we have an argument which should be convincing to the veriest Philistine. And if we were not hampered in this detail, hampered as we are in all other civic improvements, by the unfortunate condition of our laws, we could go ahead and do the thing with much greater ease than we can at present. I refer, of course, to that serious impediment to all civic improvement—the inability of a city to 'take' the lands adjoining the part to be improved. If we are to improve the banks of the rivers, for Heaven's sake let us buy up a strip on each side of the river one-eighth of a mile wide, and let the enhanced value of it go to the benefit of the whole community, and not to the accidental owners of the land in the immediate vicinity."

The Qualifications of Inspectors

THE Hudson County (N. J.) *Observer* takes up the subject of incompetent inspectors on public improvements, and states, as regards those in Jersey City, that "generally they know nothing whatever about the work they are hired to watch. Butchers are appointed to inspect the building of sewers and bartenders to supervise the laying of asphalt pavements. Each man is given a copy of the specifications and told to see that the contractor is doing the work properly; but, alas, he doesn't know what proper work is and a sharp contractor can skin him out of his eyes. . . . Now and then a good brick mason is willing to take a job of inspecting the construction of a sewer, and it is only fair to the politicians in office to say that they are more than willing to give such men work when they apply, but a good man seldom wants the appointment at the $3 or the $3.50 a day which the municipalities pay. He can do better."

An Effect of Municipal Ownership

Moody's Magazine (New York, February) directs the attention of investors to the growth of the municipal ownership sentiment, as evidenced by the results of elections in Chicago, Cleveland, Cincinnati and New York. These, the magazine believes, "are ominous to the holders of the securities of public franchise corporations which, as is too frequently the case, represent but little except the capitalized value of franchises, some of which are held only at the good-will of the party in power.

"Investors in these securities should not be blind to the fact that the people are pressing for cheaper gas, reduced car fares and lower telephone charges, and that the politicians must finally yield, at least in part, or be replaced by others who are willing to grant the wants of the people. If, as is not improbable, New York City should decide to build and control all future subways and to compete with the existing subway, surface and elevated systems in the carrying of passengers, what would be the value of the last $108,000,000 of water poured into the capital of the Metropolitan Transit system and which brings the total capitalization up to over $500,000,000—at least two-thirds of which represents franchise value based upon present monopoly conditions?

"This is but an instance of what may happen in one city. The same tendencies exist in other cities. The wise investor will keep his ear to the ground and look with both eyes, to make certain that he is not caught with the dropsical securities of public utility corporations in cities afflicted, or likely soon to be afflicted, with this dangerous and contagious municipal ownership disease. In no other direction, perhaps, will it be so easy for investors, during the next few years, to make mistakes."

Civil Service Examinations

AN incidental allusion was made, on page 160 of our issue of February 14, to the effect of civil service rules in excluding competent and experienced men from appointments, owing to their inability, from various causes, to conform to the exacting standards prescribed—these being by no means representative of the skill and knowledge required for the work. A striking illustration of this fact is furnished by figures which *The Engineering Record* (New York, February 10) has collected in regard to a New York examination of this character, the occasion being the need for engineers in the service of the Board of Water Supply. "About 800 men asked for information about the examination and 522 filed applications to be permitted to take part. Although the candidates were of unusually high quality, only 19 passed the examination for the highest grade, 47 that for the middle grade and 131 that for the lowest grade. The questions were printed in this journal on February 3, and were fair tests of a candidate's knowledge and common sense. A treatise could be written on some of them, but the candidate's sense of the fitness of things will be shown by his answers to such questions, which can be satisfied by a condensed sketch of the whole subject or by detailed notes of each part of it. Some first-class men failed to pass the examination and some undesirable candidates were successful, but the fact of all others that stands out most prominently is the inability of three-quarters of the technical school graduates who took the examination to pass the lowest grade."

The Grouping of City Buildings

DULUTH is to be added to the growing list of American cities which are looking ahead in the matter of locating public buildings on a more systematic plan than has hitherto prevailed. A new Court House, to be erected at the corner of Fourth avenue, West and First street, is to be the nucleus of a general plan, a City Hall being contemplated as the next addition. Washington, Cleveland, St. Louis and St. Paul are among the larger cities which have taken active steps in this direction.

DIGEST OF CURRENT LITERATURE ON MUNICIPAL TOPICS

Self-Effaced Citizens

City Affairs (Boston, February) the organ of that city's Good Government Association, deals with the neglect of civic duties in a suggestive article in which regret is expressed that less than 50 per cent. of Philadelphia's voters exercised their right at the election of 1903, while in the Boston city election of 1904 there were 42,874 abstentions among 114,576 registered voters. We extract the opening paragraph:

"One of the ablest and most friendly of our foreign critics has said, in effect, that the blackest spot in American politics lies in our failure to properly govern our great cities. The truth of this criticism must be apparent to even the most casual student of American municipal affairs. The whole structure of our municipal as well as our national life is founded on the theory of the personal responsibility of each citizen to the welfare of the city and nation. In 'The Government of our Municipalities' Mr. Dorman B. Eaton points out that by the idle and senseless method of allowing national parties to contest for the control of our cities we have divided the friends of good government in hostile ranks, and subordinated municipal interests and duties to the advancement of mere party ends, or to the ambitions of unscrupulous politicians. This method has been in part responsible for the election to important positions of men of less business capacity, and often times lower moral character, than could gain positions of anything like similar importance in private affairs. It is also mainly responsible for the fact that the dignity and importance of municipal affairs is greatly underestimated, and it becomes increasingly difficult to secure competent men as candidates for municipal office, or to take active leadership in the management of our great cities."

New York's Progress and Opportunities

The American Architect (February 17) quotes from an address by Sir Casper Purdon Clark before the Architectural League of America, February 2, 1906, in which the Director of the Metropolitan Museum of Arts described his impressions of New York, as seen from the harbor, as follows:

"When I first saw New York, twenty-one or twenty-two years ago, I thought on entering the harbor what a magnificent opportunity they had lost for making a grand Venice; it reminded me of Venice. But treated in rather a great manner it would have been the grandest city in the world. That was my thought. I was only a few weeks here, and the thought did not last many days, because the second day I was here I saw the people clearing out in the evening, going to Brooklyn and to Jersey, and then I realized that with a city with a population as large as this it was necessary to have a different class of buildings from anything they had in Venice, and I wondered how you would meet the problem. I arrived here a few months ago to find that you had dealt with the problem; you had not created a second Venice, but something in a way much greater. I do not say more beautiful, but it was appallingly grand. The effect of these enormous buildings, as you come up the harbor, with their myriads of tiny little windows—port-holes of commerce—make them look at first like fortresses. When I first saw those fortresses I was reminded of old Cronstadt. New York had become a vast city, covered with houses full of loop-holes; not with guns behind them—not with guns of war—but far more deadly guns, the guns of commerce, which destroy their enemies without the slightest chance of their enemies hitting back. That is the appearance New York had to me when I arrived this time. I think I must limit my remarks simply to that fact. You lost the chance of making it a Venice, but you didn't want a Venice."

A Severe View

The Arena (Boston, March) refers to the successful operation of street railways by the city of Manchester, England, and adds:

"It is easy to understand why Thomas F. Ryan, August Belmont, J. Pierpont Morgan, and other public-service magnates are anxious that the city should not incur 'the risk of squandering money' by taking over the franchises and operating the service for the benefit of the public, and it is also easy to understand why the corrupt political bosses are opposed to public-ownership. The corrupt public-service companies keep the bosses in power and corrupt the whole service. Without the tremendous backing of the public-service corporations, the bosses would be as Samson shorn of his locks and they are fully aware of this fact. Happily the public, in spite of the controlled editors and educators, is everywhere coming to see that private-ownership of public utilities is a double curse. It results in the most shameful spoliation of the people and the corruption of their servants, as well as of the public opinion-forming agencies. It robs the millions while it degrades manhood and corrupts public morals. Therefore we find everywhere the leagues of spoliation and degradation on the defensive; but they must follow the insurance grafters, and they will follow them."

Municipalization

The Evening Transcript (Boston, February 7) discusses the proposed reconsideration of the vote which resulted in the defeat of a proposal to embark on a costly scheme of municipal lighting, and dilates on the dangers arising from a neglect of technical details in considering such a matter. "It is impossible," the editorial proceeds," "in any fair consideration of the subject to ignore this technical side. The modern public service corporation has come to be a highly specialized institution. It has a large number of men, each of whom is working on a single idea, with the purpose of cheapening an existing process, or of producing some substance of value in a commercial

way. To do this sort of thing there must be brought into play broad business principles and expert knowledge. It may be argued that the city would avail itself just as freely of this expert knowledge, and that the results would be the same as in the private corporation. Unhappily, however, when cities engage experts they either run up the expenses above that which a private corporation would incur, or money is carelessly wasted, or the results are valueless. The city does not get the best of service, even in a professional way. One reason for this is that when a professional man becomes a regular salaried employee of the city he takes himself out of the competition for employment which might give him a greater return, calling on his energies and ambition to excel; and the other is that he is dependent upon the people in power, and with a change of administration his work is likely to be dropped and something new taken up by his successor.

"We have nothing in this country akin to the professional administrative officer in Germany, who holds his position as Mayor of a city for a long period of years, and may even be called upon to manage affairs in other places. He is similar to the President of a great American corporation. What use to blink the sad fact that here in America we have instead the professional politician, whose success depends upon what he can get out of his office during his party's term of incumbency, with subordinates whose success is dependent upon the term of office of a party leader?"

The Economy of The Steam Roller

The Engineering Times (London, February 1) quotes the following remarks of Mr. P. C. Cowan, M. Inst. C.E., of Dublin, an authority on this subject:

"All rolled road surfaces require very careful attention and upkeep, with small quantities of fine material to keep the surface smooth. In cases where it is necessary to lift the centre of an old road more than six inches, stones more coarsely broken, but still as far as possible of uniform size, may be used for any coats below the top coat, but no coat should be rolled more than six inches deep at a time. There is absolutely no doubt as to the economy of the use of steam rolling on roads; and it is high time that the old barbarous method of leaving materials to be beaten in by the wheels of vehicles and the hoofs of horses should be abandoned, except on minor roads with light traffic, which may properly be maintained if the crust is of fair thickness, with very finely-broken stones or gravel unrolled. The cost of steam rolling in coats of moderate thickness is, roughly, from sixteen to twenty-four cents per cubic yard.

Low Municipal Wages in Madrid

An article on the governmental and municipal services of the Spanish capital, by Chester Lloyd Jones, of the University of Pennsylvania, is included in the January (bi-monthly) issue of *The Annals of the American Academy of Political and Social Science.* The following extract, in regard to street cleaning, indicates the lowness of wages paid to municipal workmen in this city of 533,286 inhabitants:—

"In the work of sweeping there are employed a little over 700 men for the entire city. . . . The entire cost of the sweeping and flooding of the streets is only $86,215, or a little over 15 cents per year per inhabitant. The small expenditure is due both to the neglect of the outlying quarters and to the cheapness of the manual labor employed. In the entire force of 949 men in the service there are but two—the paymasters—who receive a salary as high as fifty cents a day. Six hundred and fifty, including all the overseers, timekeepers and broom-men, receive 37½ cents or less and the hundred men who attend to the flooding of the streets receive but 22½ cents per day. This wage represents the entire income, as these men are but day laborers and do not receive houses at the city's expense or a pension after a period of service. The wages paid by the city for street cleaning are rather higher than those given in general for manual labor, as the average wage for unskilled labor is 15 cents a day."

The Smoke Evil

The Scientific Australian (Melbourne, December 20, 1905) comments as follows upon the reasonableness, or otherwise, of the attitude assumed in regard to the smoke nuisance:—"Municipalities have a right to insist upon the abatement of black smoke by all users of steam boilers, without regard to the purposes for which the steam is used or the means to be adopted for abatement. This, because smoke is a public nuisance, and because it can be abated without hardship to the owner of the plant. Nevertheless, when the evil is present, and has been present for a period of years, it is not good policy to be too radical in the enforcement of the statutes. The law should be definite and stringent, and the penalties adequate, but they should be enforced with discretion by officials who have some technical and practical knowledge of smoke abatement. It is absurd to talk of putting this matter into the hands of the police or of the health officer. The official having charge of this work should be a trained engineer, if possible, a technically-educated man, and he should be entirely above influence in any of its guises."

Charities and The Commons (New York, February 10) details, in an article by Mary Sherman, of the National Consumers' League, the conditions under which macaroni and confectionery are manufactured in some of New York's slums. The particulars given are the result of an investigation by the League, and will carry dismay into quarters where it had been believed that the dangers depicted were no longer among the possibilities in Manhattan.

Pacific Municipalities (Santa Clara, Cal., January) is mainly devoted to the proceedings at the eighth annual convention of the League of California Municipalities, held at Chico, November 15-17. A wide range of civic subjects was discussed and many of the reports are significant of the progress being made in street cleaning, garbage disposal, the care of trees and other lines of work.

Rock Products (Louisville, Ky., January 22) deals with the subject "Developing the Concrete Mixer" in a well considered article. The writer is impelled to the conclusion that "no one mixer will ever succeed in being sole master of the situation," this being largely due to the different demands made by wet and dry mixing. "After interviewing twenty-five concrete contractors and asking them all practically the same series of questions, we find that we have twenty-five distinct ideas as to just how the materials should be handled before they are placed in the concrete mixer. One man, who has had no little success in his undertakings, attaches no great importance to the mixture of his materials. He said, 'I use any good Portland cement, and such sand as can be conveniently secured, according to the location of the job, and crushed rock, including the screenings, as it comes from the crusher, and these are mixed in the general proportions of 1, 2 and 3, one of cement, two of sand and three of the crushed rock.' Now, standing alongside of this man's operations, you will see his workmen shovel a wheelbarrow load of crushed rock off the ground containing small pieces of brickbats, cinders, macadam rock, screenings; in fact, not the slightest care was taken in shoveling up the material. The sand also has been dumped on the ground and this is shoveled up in the same manner and loaded into his batch mixer. Another man comes along with a sack of cement on his shoulder, pours it in with the other materials, closes the lid and turns on the power. The water is supplied by means of a faucet and it is allowed to run 'about long enough'; then the faucet is turned off and the mud is emptied out into the wheelbarrows and deposited in the forms. Now, there is no way in the world for that man to tell, with any degree of certainty, of just what his concrete mixture consists, and although he has never had any trouble with any of the work he has put up we can not help but feel that some day such proceedings are going to bring him right up face to face with a failure."

The Yale Review (New Haven, Conn., February) has an instructive and suggestive article, by Robert C. Brooks, on "The Municipal Gas Works of Berlin," that city possessing the largest municipal gas plant in the world. The history of the enterprise is traced from the year 1825, when an English corporation, the Imperial Continental Gas Association, erected works under an arrangement—not at that time so peculiar as it would now be regarded—with the Prussian Ministry of the Interior and Police, the city authorities having nothing to do with it. Local government has made some strides, even in Germany, since that time. The municipal works date from 1847, and a specially interesting part of the article deals with the measures adopted by the Company to meet the competition then introduced, its production of gas showing a large increase as a consequence of the lower prices charged. Of the municipal works, it may be noted that the make of gas doubled in the eight years between 1849-50 and 1857-1858, and quadrupled in the fourteen years from 1849-50 to 1863-64.

The Board of Trade Journal (Wilkes-Barre, Pa., January) is the first number of a monthly periodical published under the auspices of the local Board of Trade and designed to stimulate the interest of citizens in the welfare of "The Diamond City." Articles on the early history of the settlement, Greater Wilkes-Barre, and the proposed Park system are among the literary contents of a journal which should succeed in the endeavor for which it has been established.

Die Zeitschrift für Bauwesen (Berlin, 1906, Nos. 1-3) describes and illustrates, in an appreciative spirit, the artistic new Parliament Building in Copenhagen, erected from the designs of Architect Martin Nyrop of that city. It is seldom that even so fine a building receives such complete treatment in the press; even those unfamiliar with German may find inspiration in the splendid plates and half-tones with which the text is embellished. Another notable building, shown in the same issue, is the head house of the new railway station in Worms.

La Technique Sanitaire (Paris, January) is the inaugural issue of a journal which is intended to serve as the official organ of the *Association Générale des Ingénieurs, Architectes et Hygiénistes Municipaux* of France, Belgium, Switzerland, etc.—a body somewhat on the lines of the Royal Sanitary Institute of Great Britain and the British Incorporated Association of Municipal and County Engineers. The Association was founded in November last, and its aims and regulations are given at length in the present number.

The St. Louis City Charter

THE Civic Improvement League of St. Louis, Mo., is taking an active interest in the movement for a new city charter, the study of this question having been delegated to a special committee. In a statement recently issued by this committee, it is urged that charter revision is necessary on general and specific grounds, among the former being the business character of the city as an organization, whose department should carry on the city's affairs "with clear division of responsibility and commensurate power." The Municipal Assembly, it is pointed out, should exercise supervisory and legislative duties only, the idea being that, in this way, the services of actively engaged business men can be secured as city legislators without unreasonable sacrifice of their time to public interests.

The existing powers for the removal of officials, whether by the Mayor or by heads of departments, are stated to be inadequate. Increases of salaries are recommended where necessary to secure and retain skilled service; a department for the control of public utilities is required; a reorganization of certain departments is declared to be necessary, and an improved revenue system should be devised. These are some of the items in the League's plan of reform.

PUBLICATIONS DEALING WITH MUNICIPAL SUBJECTS

Book Reviews—Municipal Reports and Public Documents Received

The Metric Fallacy, by FREDERICK A. HALSEY; and *The Metric Failure in the Textile Industry,* by SAMUEL S. DALE. New York: D. Van Nostrand Company, 23 Murray street.—6 by 9 inches, cloth, 231 pages. Price $1.00.

The Littauer Bill, now before Congress, would render it obligatory upon all U. S. Government departments to use metric measures after a date named therein. This fact alone gives value to the appearance of the present volume at this time, as there is only too much reason to believe that many people have been led to favor this foreign standard by a too ready acceptance of the one-sided statements—they cannot be called arguments—put forth by publicists who allow their enthusiasm to outrun their discretion. The recent "antics" of a New York daily, as they have been called by a technical contemporary, afford a good example of what we have in mind, the one redeeming feature of the propaganda still being carried on by it being the obviousness of its inspiration and the entire absence of even the most rudimentary facts on the other side. THE MUNICIPAL JOURNAL AND ENGINEER, in its January monthly issue (page 24) took occasion to refer to some of these, and the present volume deals with these, and others, at the greater length rendered possible not merely by its size but by the recognized competence of its authors.

Of the two parts into which the book is divided, that occupied by Mr. Halsey is of most interest to civil engineers and others of our readers who desire to be enlightened on the merits of the metric system on the one hand and an intelligent use of existing standards on the other. But Mr. Dale's researches as to the still prevailing use of earlier standards in countries, France among the rest, in which the metre is popularly believed to have reigned supreme for many years, is not without value as an indication of the drawbacks inherent to this so-called perfect system of measures. In no respect is this more apparent than in the textile industry, where the practical advantages of the supposed discarded standards have maintained them in their pride of place. So strong is the hold which the latter have succeeded in obtaining that even in autocratic Germany—a country frequently pointed to as affording an example of the ease and celerity with which the adoption of the metre is supposed to have been effected—elaborate calculations by textile producers are still carried on in a mixture of English pounds, French metres and grams, English yarn counts and skeins. This is but one of the many instances cited in the book to show the baselessness—not to say insincerity—of the statements underlying the argument for the adoption of the metric system in this country. That argument assumes that the American people can adopt it, and adopt it easily. To bolster up this attitude, it is alleged that Germany found it possible so to do, regardless of the totally different conditions confronting the two countries both as regards the necessity for a change and the relative freedom from obstacles in its path. This country is under no such disability as confronted a unified Germany after the war of 1870, when the number of "feet" in use was scarcely excelled by the puzzling variety of coinage which baffled the weary traveler of those days. More than this, the position since won by Germany in the industrial world was hardly dreamed of when the change was made—a condition vastly different from what prevails to-day in the United States, where thousands of millions have been invested in industrial machinery to existing gauges, to change which would involve, apart from the inconvenience and delay, an outlay of many millions more.

This feature is dealt with in the book, though less fully than was done in a canvass of manufacturers arrayed against a previous bill before Congress, many stating that its passage would involve their renunciation of Government work, in preference to embarking upon the expenditure entailed. A point of special interest to many of our readers is the emphasis placed upon the fact that while it is comparatively easy to change standards of money and even of capacity, interference with the unit of length involves difficulties appreciated only after close study of the conditions. Again, the advantages claimed for the inter-relation of length, weight and capacity standards in the metric system are shown to be illusory, the use of distilled water as a connecting medium in this process being cited as demolishing its vaunted value in calculations as to the flotation of ships in *salt* water. We earnestly commend this volume to all who are wishful for data on which to form a sound judgment on a question which is being pressed forward, with inconsiderate zeal, for settlement by English-speaking races.

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The Law Relating to Oil and Gas. By W. W. THOMSON.—Cincinnati: The W. H. Anderson Company, Law Book Publishers. Calf, 6½ × 9¼ inches, 918 pages. Price not stated.

While this bulky volume is largely devoted to the oil industry, with the many questions of production, sale and transfer, easements, partnerships and other items incidental thereto, the powers of municipalities in regard to street and domestic gas lighting, their relations to gas companies, and the rights of the latter under general and special enactments are discussed in such a way as to render the book a valuable acquisition to municipal and official libraries. Thus, the rules governing the necessary consent of municipalities to the breaking open of streets, and the exceptions to this course under special legislative provisions, are set forth in luminous fashion, the references to authorities and ruling cases being in this, as in other parts of the work, of special value. Similarly, the obligations imposed on gas companies not

merely to furnish gas but to treat all alike in so doing, open up the question arising, in the case of natural gas supplies, when these sources fail.

The law, with representative cases, as to the use and testing of meters is fully discussed in the light of the principle that, while the meter measurement is *prima facie* correct, yet the consumer may show it to be incorrect, with all therein implied. Nuisances caused by gas works, directly or indirectly, with the extenuating or mitigating circumstances which it is feasible, or otherwise, to urge, are dealt wth at considerable length, and even the effect upon an insurance policy, in cases of inhalation of gas, is reviewed in the light of decided cases. The book is, in fact, a complete compendium of this department of law and, as such, can be confidently recommended to a considerable section of our readers.

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A Handbook on Reinforced Concrete. By F. S. Warren, Mass. Inst. Tech., 1900. New York: S. Van Nostrand Company. Cloth, 4½ × 7¼ inches, 271 pages; cuts and plates. Price, $2.25 net.

A book of this character has been wanted for some time, the reinforced concrete field having grown in advance of its permanent literature. A wise discretion has been exercised by the author in "treating upon a general form of design rather than upon any one particular or patented system," this method being more likely than the other to qualify the student for scientific examination of the many systems having a literature peculiar to themselves. Beginning at the root, with the tensile strength of cement, the introductory section furnishes just sufficient data to initiate the reader into the more specific subjects dealt with in the two succeeding sections, respectively devoted to the tensile strength of concrete-steel and designs of concrete structures. Part IV. takes up the design of trussed roofs in this material, a growing demand existing for structures which will withstand deterioration or destruction from the effects of gases, vapors or fire.

The book abounds with tables, many of them of the truly labor-saving kind too seldom met with, and the typography is an admirable feature of a book well deserving of extended use by civil engineers, architects and others.

♣

Principles of Economics. By Edwin R. A. Seligman, LL.D., McVickar Professor of Political Economy, Columbia University. New York: Longmans, Green & Co. Cloth, 5½ × 8 inches, 613 pages; with maps and diagrams. Price, $2.25.

This notable addition to the American Citizen Series, while abundantly justifying its claim to have special reference to American conditions, has no cause to fear comparison even with more pretentious works dealing with "the dismal science" as a whole. Timely in its appearance, at a juncture when men are called upon, as plain every-day citizens, to take up a range of studies but recently confined to burners of the midnight oil, it will appeal to a large circle of readers by its attractive style and the concise completeness of its contents. Many subjects now engaging the attention of civic workers are here treated, if not directly, at least in such a way as to supply food for thought and material for enlightenment. Among these we may note the author's remarks on the law of depreciation, corporate enterprise, railway charges and social monopolies. Chapter XXXIII, dealing with "Government and Business," is especially valuable to-day, its judicial reasoning and impartial presentation being in striking contrast to much to be found in the daily press and even in more leisurely publications.

♣

British Progress in Gas Works Plant and Machinery. By C. E. Brackenbury, Assoc. M. Inst. C.E.—London: Archibald Constable & Co., Ltd.; Chicago: W. T. Keener & Co. 7 × 10½ inches, xii + 105 pages; copiously illustrated. Price $2.40 net.

While nominally dealing with British progress alone, the present volume forms a readable synopsis of the stages through which illumination by gas has passed since its introduction by Murdoch in 1792. The connection between gas and cotton mills—around which the new illuminant expanded—is as close as that between railroads and collieries, and the improvements effected in the industries thus closely affected by new inventions have been startling in each case. The whole process of gas manufacture is described, the successive changes in appliances and manipulation being recorded.

Among other chapters of the book those dealing with the increasing use of gas for fuel, either for industrial or domestic purposes, and with the fluctuating career of by-products will be of interest to the American as well as the English reader, while both will find in it a useful record of changes not a little liable to be forgotten in the present status of the industry and its results.

♣

Crematoria in Great Britain and Abroad. By Albert C. Freeman.—London: The St. Bride's Press, Ltd., 24 Bride Lane, E. C. Cloth, 9 × 11 inches, 35 pages; with 29 plate illustrations and 38 cuts in the text.

In noting the appearance of the articles forming the present volume—they were originally published in the *Surveyor*—we ventured to prophesy their presentation in the present more enduring form, amply justified by their merit. The author has studied his subject and is able to present the principal features of many representative works of this character. These include the best-known British as well as many foreign edifices. Among the latter are the crematories in Boston, Montreal and Oakland, Cal. The price of the volume is not at present before us; we hope to make it known in our monthly issue of April 4.

♣

Davey's Primer on Trees and Birds. By John Davey, Author of *The Tree Doctor,* etc.—Sewickley, Pa.; Published by the Author. Cloth, 5¼ × 7½ ins., 165 pages. Illustrated. Price, 50 cents.

No introduction to the Author of this small essay is required by those who read his contribution, "A Plea for the Trees," to The Municipal Journal and Engineer of January 17. The same earnestness of purpose which pervades the article is found in every page of the book,

which treats of the harm being done to trees by unskilled "butchers" and corrects some popular fallacies as to the share borne by birds in maintaining, or destroying, the balance ordained by Nature. The illustrations are a noteworthy feature of the volume; cuts and descriptions of birds were furnished by the Department of Agriculture and there are many excellent reproductions of photographs taken by the Author. The work is the outcome of his belief that if the country's trees are to be preserved the education of the children must be the starting point. But children of a large growth, including many who have city trees under their care, can find enlightenment within its covers.

♣

Hygiene and Public Health. By B. ARTHUR WHITELEGGE, C.B., M.D., and GEORGE NEWMAN, M.D.—Chicago: W. T. Keener & Co., 1905.—Tenth Edition. Cloth 4½ × 6½ ins., 636 pages Price $1.75 net.

Largely based upon British requirements for the duties to be performed by Medical Officers of Health, the present revision of a work originally published in 1890 will be found useful to American officials and students if only on account of the wide field dealt with. Apart from the physiological matter relating to phthisis, pneumonia, typhus, typhoid, and such exceptional maladies as beriberi and leprosy, the authors discuss preventive medicine in the most comprehensive sense of that term. Thus, the hygienic planning of schools and hospitals, methods of water analysis, the disposal of excrement, the treatment of sewage, and the influence of food upon health are but a few of the subjects more or less fully reviewed. Much care has been devoted to making the work truly representative of present knowledge and there are few, even among those claiming to be sanitary experts, who will not be the better for being able to refer to its pages.

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Surface Contact Traction. By W. Noble Twelvetrees. —London: *The Engineering Review, Ltd.* (No price given.)

This reprint from *The Engineering Review* appeals for consideration of the surface contact system of street railway traction at a time when the London County Council contemplates an expenditure of about $25,000,000 on the electrification of its northern street railway system. The preface refers to the action of New York, nearly twenty years ago, in compelling the removal of trolley equipments, and emphasizes the objectionable costliness of the open conduit system, adopted by the Council some years ago for other sections of its metropolitan lines. The pamphlet itself gives detailed and illustrated descriptions of the various types of contact systems in use and discusses their relative merits in such fashion as to make it a valuable source of information on a subject of increasing importance.

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Proceedings of the Municipal Engineers of the City of New York for the Year 1904.—New York: Published by the Society, 1905. Paper Back, 6 × 9 inches, 211 pages.

These papers form a valuable contribution to the literature of municipal engineering, dealing as they do with the design and construction of undertakings with which a large proportion of executive city officials in this country are brought into more or less intimate contact. The subjects treated include the investigation of new water supply sources and works for the city of New York; the design of sewage precipitation plants and septic tank installations; the maintenance and repair of asphalt pavements; bridge and school construction, and an argument on plans and specifications for contract work. Apart from the solid technical value of the papers themselves, the discussions afford perhaps an even greater insight into the reasons dictating or prohibiting a given course. The illustrations add largely to the completeness of the book.

Public Documents Received

Annual Report, Concord, N. H., for year ended December 31, 1904.

Municipal Reports, St. Joseph, Mo., for year ended April 14, 1905.

Revised Charter of the City of New Britain, Conn.—Passed July 6, 1905.

Annual Report, City Auditor, Dallas, Tex., for year ended April 30, 1905.

Annual Report of the Department of Public Works, Rochester, N. Y., for 1904.

Report of the Bureau of Water, Schenectady, N. Y.; year ended November 1, 1905.

Report of Water and Light Department, Danville, Va., for year ended April 30, 1905.

Annual Report of the Board of Health, Bridgeton, N. J., for year ended June 30, 1905.

Annual Report of the Michigan State Board of Health for the year ended June 30, 1903.

Special Laws relating to Hartford, Conn. Passed by General Assembly, January, 1905.

Annual Report of the Cambridge, Mass., Water Board for the year ended Nov. 30, 1905.

Annual Report of the Department of Public Health, Colorado Springs, Colo., for 1904.

Report of Street Cleaning Department, District of Columbia, for year ended June 30, 1905.

Report of Chief of Fire Department of the District of Columbia for year ended June 30, 1905.

Annual Report, Department of Public Safety, Troy, N. Y., for year ended December 31, 1904.

Report of the Board of Electrical Commissioners, Wallingford, Conn., for year ended July 31, 1905.

Annual Report, Board of Water Commissioners, Atlantic City, N. J., for year ended January 1, 1906.

Annual Report of the Board of Water Commissioners, New London, Conn.; year ended September 1, 1905.

First Annual Report, Board of Gas and Electrical Commissioners, Norwich, Conn.; year ending July 31, 1905.

Bulletin No. 5, Ohio State Highway Department.—"Convict Labor for Road Improvement."—Columbus, January.

Bulletin of the Bureau of Labor. Labor Conditions in Porto Rico. Early Organization of Printers. Nov., 1905.—No. 61.

Modern Practice of Water Softening *

Since the middle of the nineteenth century, when the first water softening plants of large size were built in England by Porter and Clark, the art of water softening has passed through a series of very interesting evolutionary changes. The original forms of apparatus were simple, crude and not always efficient. Although started in England, it was in France and Germany that the process received its first important developments, and it was by the French that improvements were made which foreshadowed the type of softener now so extensively coming into use in the United States. Although improvements have been made in the art of water softening, the scientific basis of the process has not materially shifted. No better, at least, no cheaper chemicals have been found than lime and soda, and, while more is known about the practical methods of preparing and applying these reagents, the fact remains that recent improvements have been those of the art rather than of the science.

Water softening plants have been constructed both on the intermittent and continuous plans. In the former a certain quantity of water receives its proper dose of chemicals and is allowed to stand in a tank until the resulting precipitate has settled. The dose is varied according to the quality of the raw water, and in the case of a water of variable quality this method has its advantages. It requires, of course, large tankage compared with the daily yield of the plant.

The plants which operate continuously are more generally satisfactory and are destined to supersede those of the intermittent type in most cases. They require, of course, more complicated appliances for properly feeding the chemicals and a more careful treatment of the softened water, but all the inherent difficulties are being overcome, automatic regulating devices are being perfected, and the principles of proper control of the chemicals by simple analyses are being better understood.

In the past, the chief reliance has been placed on sedimentation to remove the lime and magnesia precipitated from the water, although a crude filtration through excelsior or sponge has been resorted to; filter presses have also been used. In the future, however, there is reason to believe that greater relative attention will be given to filtration, especially in the case of supplies where the softened water is to be used for domestic as well as industrial purposes. The municipal water softening plant of the future will resemble a mechanical filter, but with a greater development of the sedimentation basin and more elaborate devices for chemical treatment.

Waters to be used for different purposes require somewhat different chemical treatments. For example, a water to be used in a large stationary boiler may be treated with soda to the point of excess, thus taking advantage of all the removal of the hardening constituents possible, but in the case of locomotive waters an excess of soda would be likely to cause objectionable foaming. For some manufacturing purposes, and for general domestic uses, it is necessary to supply a certain amount of carbonic acid to the softened water in order to change the lime back to calcium bicarbonate and thus prevent troublesome deposits of lime on the pipes, meters, valves, etc. Little attention has thus far been given to this part of the process, but in large city plants it is one of the important elements.

The cost of water softening plants depends upon the size of the installation, the smaller plants being relatively much more expensive than the larger plants. Thus, a plant of 5,000 gallons per hour capacity might cost $5,000, or $1,000 per thousand gallons, while a 100,000 gallon plant might cost $25,000, or $250 per thousand gallons, these figures referring to the common type of softener for industrial uses. The expense of operation varies naturally with the quality of the water, the amount of chemicals needed depending upon the hardness of the water. Chemical costs of from two to five cents per thousand gallons are common.

The process of water softening, when coupled with mechanical filtration, may be made to yield a water not only good for industrial uses, but safe for drinking purposes. If the magnesium content of the water is sufficient, the use of alum, iron or other coagulants may be dispensed with, and the flocculent hydrate of magnesium may be depended upon to entangle the bacteria, clay, and fine suspended matter, so that after a rapid filtration through sand the water becomes clear and safe and wholesome.

There are but two important municipal water-softening plants in operation in America to-day, one in Winnipeg, Manitoba, and one in Oberlin, Ohio. In some cases, however, water softened for industrial uses is served to the public for general use, as in Elkhorn, West Virginia. A large plant at Columbus, Ohio, is, however, in process of construction. When people come to realize how much hard water costs them, and learn that at a moderate cost water can be softened and at the same time made free from disease germs, many such water-softening plants will be built in this country.

* Abstract of the last of a series of six lectures on "The Industrial Uses of Water," given, on Tuesday evenings, before the Polytechnic Institute of Brooklyn, by Consulting Professor George C. Whipple, of the Department of Chemistry.—Lecture of February 13.

The Pollution of Streams

Legal or departmental action is being increasingly invoked in order to secure redress for the pollution of streams in different parts of the United States. Thus, the City of Durham, N. C., brought suit against the Eno Copper Mills, of Hillsboro, to restrain the mills from dumping garbage into Eno river, from which Durham obtains its water supply. The desired injunction was granted by Judge C. S. Furgerson. At Ogdensburg, N. Y., the U. S. War Department has taken steps to correct the abuse of dumping refuse on the ice in the St. Lawrence river during the early months of spring. The use of the river for this purpose, which has gone on for some years, was brought about by the prohibition of dumping elsewhere, and Major Daniels, Collector of the Port, has now unearthed an act making it a misdemeanor to dump garbage in this manner, under a fine of not less than $500.

CONTROL AND SUPPRESSION OF CRIME*

By Hon. J. S. Caster, Mayor of Burlington, Iowa

CRIME started with Adam and Eve, and has continued ever since. I do not consider myself capable of defining any remedy for crime or of establishing any method by which others can stop, or even check its wide sweeping influence upon the coming generation. What suits one locality would be ruin to another. It must be grappled with just where, and in the manner in which it is found. What will answer for an inland municipality will not do for a river municipality, or one with a large railroad center, where the floating population gathers. Crime and criminals seek the cities where they can move in the most directions, should they find it best to flee for their liberty.

The first place I started upon the checking of crime was in my police department. By placing every man upon his honor, permitting no drinking of intoxicating liquors while on duty, allowing each man to have his own rewards for the service he renders, not compelling him to divide his rewards for faithfulness with the chief, captain, sergeant or anyone else. I furnish the department with a slip printed as follows:

PRIVATE INFORMATION FOR THE MAYOR.

Date ..... 190..
Received from .....
Article received .....
(State what you received.)
For what service .....
.....
.....
Officer's Signature

The men are allowed to have everything that is given them, but we insist upon their reporting everything outside of a cigar that they receive. Anything they do not wish to report, they must refuse, even to a nickel to buy a cigar with. The first time one fails to report things given him, he is laid off for fifteen days to study the rules, and this is a good object lesson for the rest of the force. The second time that he is caught not reporting he is dismissed from the force, for no matter how valuable an officer he may be, he is not worth the corrupting of the entire force.

Show no favoritism. And I consider it of great importance to keep control of the police department, for if you do not it will politically, if not morally, kill you. Many a good mayor has been injured morally because he had not the courage to say that his soul was his own, and let some one under him sell it. When you have control of the police department, then you can get better control of crime; not until then.

Gambling is one of the greatest social evils we have to contend with. This hidden sin develops in many branches of life. Gambling existed before the Bible was published. It is an evil that will be with us for generations to come, in some form or other. The question is, how can we control it, so as to do the least harm to the coming generation? I will simply tell how I control it in my own city, and leave it to others to find a better way.

The Good Book says, "Let your light shine." That is the principle I have adopted. I let my light shine upon every evil that I possibly can. When a young man starts on the downward road he does not start the fatal slide in public. Evil devices and the devil's deeds seek darkness and hidden places. Stop to think how few of our crimes are committed in the public view of the world and you will be amazed to see what a small percentage are not committed under the cover of darkness or in places secluded from the public eye. Evil in its various forms shuns publicity.

Vice takes hold of a soul started on the downward road like fire does a prairie. It starts from as small a thing as a match, and spreads, sweeping everything before it; conscience, honor, loved ones, everything is lost. Light and publicity to sin are like water to fire. If you can give it sufficient light and publicity it must die out.

Here we have a remedy by which we can control the flame of sin if we can not put it out entirely. Therefore I am like a hound after its prey. I keep well upon the scent of all hidden places where crime is committed. I stop gambling in saloons, back of cigar stores, drug stores, club rooms, and all scheduled places. Put it up in the second story of a building where it is constantly under the eye of the police department, and upon a public street where many pass the stairway; close the back doors, put a door part way up the stairs, which at all times must be locked to prevent any innocent person entering, then place a light at the foot of the stairs, so that the passers by can see everyone who enters. Should one sneak in, he is detained upon the stairway while the door is being unlocked, and is thus exposed to the view of the passer by. Allow no pass keys to this door. I cut out all skin games; limit them to straight percentage games, control being the chief object until I can prohibit. I never attempt to conceal crime in any form. I arrest the gamblers with a warrant for misdemeanor as often as necessary to maintain order and full control, bringing them before the police judge every time. I allow no one to secretly collect fines. They must be paid to the police court, thus throwing light and publicity on one of our greatest evils.

No young man who has any respect for himself, or regard for his good name or who holds his position in esteem, will enter these hell-holes under this glare of publicity. Only the hard-shell gamblers, who, if no place is

* From "The Bulletin of the League of American Municipalities," December, 1905.

assigned them, will seclude themselves and send out what are known as cappers to bring what is called fresh blood, which means the kindling of a fire in the heart of some heretofore good man or boy, who has been duped into playing his first game of chance in some secluded place, thus creating a desire to win back what he has lost, which means his final downfall and ruin.

This can only be accomplished in time, but if the mayor is the people's mayor, he will ever have before him the aim of reaching the highest possible moral standing of his community, and will work gradually, but faithfully, toward this end. This has been my aim, and I have tried to show the progress so far as I have reached it. What I will do when I have the sporting element taught that they cannot maintain secret places remains to be seen.

One thing is sure, I never will say that there is no gambling going on in Burlington, as long as I know there is, let it be public or private.

I know that many of your readers will not agree with me, and my methods of handling this crime, and that the clergy will look upon it in horror and amazement. They think that we should stamp out this crime at once, which cannot be done. It is easy to stop the public gamblers, but the secluded ones must be caught before you can punish them. You may ask why they cannot be as easily caught without opening gambling houses as with them. To this I will say I have the professional gamblers, with their tricks and schemes temporarily out of the way, and those seeking to carry on gambling in a secret way are more easily caught.

I can take care of the professional gambler any time when the secret places are abolished.

The clergy remind me of the story of the ostrich. It runs from its pursuers until it tires out, then runs its head in the sand, thinking because it can see no danger there is none. This is no discredit to them, for they have no opportunity of knowing the evils of the world and the difficulty of controlling them. They lose sight of the fact that too often this desire for gambling, which leads so many souls to hell, starts among their own flock. Too often the paddles of the old wheel of fortune are sold at church fairs and social gatherings. Too often they permit chances to be taken of articles to raise money to meet the needs of the church. Too often money is raised by various schemes of chance. Too often the mother goes to the card party and plays for a prize and brings it home to her little boys. "See what I have won," is heard too often by their own family circle. What matters it whether you are playing for a prize, or a hundred dollars? Is it not gambling? Is not the principle the same? Will not God hold you responsible for the kindling in the mind of others the desire to gamble, and giving them the first start on the road to ruin? Will not God blame the cowardly mayor who hides this crime, and permits a price to be placed upon innocent boys and men for their presence in these hell-holes, because he is afraid to stand up and throw light upon them, and be responsible for those, who, under cover of secrecy, made their first start to ruin under his administration? I will take my chances on throwing so much light on these roads to ruin that new beginners will shun them. If I cannot wipe it out at once I can throw enough light on this crime that the good people will, I trust, make it possible for me to wipe it entirely out of this community sooner or later.

I am not looking for re-election. I stand by my convictions. If I can not do it all, I do what I can. I may receive censure now, but the good people will realize in the future that there was a method in what seemed to them but madness.

Love of money, licentiousness and whiskey have been the ruination of people of all ages. They are evils which all municipalities have to contend with. The man does not live who can stamp either of them out so long as men will sell their souls for the accumulation of money, or for the gratification of sinful passion; nor so long as society receives the men who drag girls down to ruin; nor so long as the manufacture of whiskey as a beverage is permitted. Therefore, we must strive to control what we cannot stamp out. I hold the lines so tight and keep my eye so constantly upon the police department, that money cannot corrupt it.

I have closed the greatest curse to civilization, the wine room, where many an innocent girl has met her ruin through drugged liquors and wicked influence. Many a scheme to ruin homes has been carried out in these wine rooms, small rooms partitioned off in the back part of saloons, where parties can be out of sight while they talk and drink. I know so much about these dens of iniquity that one cannot exist while it is within my power to kill it, and I would advise every mayor who does not know of this evil to investigate, and if he is not a tool for the lower element, he will close them also.

Again, I set a definite time for all of the saloons to open and close. Whenever one saloon keeper breaks over I arrest him and fine him the first three times; then if that fails I put him out of business entirely, on account of my inability to maintain proper police regulation over his place. I aim to be fair and square in all my dealings. I treat every man alike, never taking advantage of the unfortunate, but give them a chance in all cases, then if they will not heed, bring them to time. To show you that I practice what I preach, my receipts through the police court for the last fiscal year, ending March 31st, 1905, were $10,461.65, being $5,113.36 more than the average for the past ten years. This is surely evidence that someone has been taught to obey the law, is it not?

The social evil is the thing that is the hardest to handle in all municipalities. With a floating population like Burlington, open houses of this kind are almost a necessary evil, to guard against worse crimes and to protect the innocent from the clutches of the vile wretches called men, who think no more of a girl's honor than they do of the dust under their feet. But this class must also be controlled, and that strictly so. Therefore, I treat them all much as I do the gamblers, throwing light upon their acts, to protect the minors and those who seek such places under cover. I stop street walkers, who formerly congregated about the depots, postoffice and public places, to

catch men and boys, by sending them up to the station and giving them a private lecture and letting them have another chance. For the second offense I fine them and for the third use their names in the public or printed report of the police court. If they know that this is coming they will be more careful of their conduct.

I raid every bed house or rooming house where men and women resort to for immoral purposes, and punish everyone caught therein by a nominal fine, except the keeper of the house. I give him the full limit, $100 and costs. I shall not get many of them. They will soon learn that they cannot run in this way. In this manner I am stamping out one of the curses of civilization, which opens the doorway for more innocent victims to the prey of fiends in man's garb than any other road I know of.

In placing the above facts before your readers I have confined my article to my own acts. You will see that they are original. I ask no one to follow them, but would be pleased to be convinced if there is a better way to control the social evil by someone who has had more experience than myself.

Rate Regulation

By Alton D. Adams

STATE regulation of rates is on the increase, and gas and electric companies will serve their interests by guiding rather than by opposing the movement. Regulation of gas rates began in England with the passage of the Gasworks Clauses Act of 1847, and has continued with increasing force to date. Meanwhile electric rates have also come under Parliamentary attention. In Massachusetts, legislative control of gas rates was asserted in 1885, and of electric rates in 1887, and a movement is now under way to make this control more complete. California, in 1900, delegated to some of its municipal corporations, notably to the city and county of San Francisco, the power to fix rates for gas and electric service. During the present year the State of New York has followed the lead of Massachusetts by establishing a Commission with power to fix the rates for gas and electric supply in all parts of the State, and the Legislature of Illinois has delegated a like power to Chicago, to be exercised within the city limits. These examples are perhaps sufficient to indicate the present tendency.

It should not be assumed, however, that all this legislation has come about against the wishes of the gas and electric interests affected, for in some cases these interests have actually promoted bills for the reduction of their own powers of charge. An instance in point was the introduction of the sliding scale, as applied to gas rates, by the gas interests, in a bill before the British Parliament in 1875. Provisions for the sliding scale of gas rates and dividends have since become securely fixed in British legislation, and have proved to be very effective in the reduction of rates. The same Parliament that first applied the sliding scale to gas rates had before it one bill to promote competition by the erection of new gasworks, and another to authorize government purchase of the gas plants in London. The defeat of both of these bills was probably due in no small part to the willingness of the gas interests to accept more stringent regulation of rates. So again, in the contest which led up to the creation of the Massachusetts Commission, the gas and electric interests were willing to accept full government control of rates in order to avoid competition.

The fact evidently is that under a democratic form of government the gas and electric interests must choose between more or less constant competition on the one hand and a large degree of rate regulation on the other. A study of results under conditions of competition and rate regulation seems to indicate that the latter is much the more desirable for gas and electric interests. Certain it is that rate regulation does not necessarily carry with it the destruction of a high degree of prosperity in gas and electric supply. Great Britain furnishes much proof of this proposition, and more is not wanting on this side of the Atlantic, where the results under twenty years of rate regulation may be seen in the gas and electric plants of Massachusetts. It may be asserted with little fear of contradiction that no part of the Union can show a higher degree of prosperity in its gas and electric interests than exists in those of the Bay State. To ensure such results, however, it is necsessary that the Commission or other body to which the power of fixing rates is delegated shall be both fair-minded and able. It is at this point that gas and electric companies should endeavor to guide legislation affecting rates, rather than to waste their influence by opposing all rate regulation until some popular movement, led perhaps by persons whose motives are entirely selfish, vests authority to fix rates in local municipal officers, or those who have neither the technical nor legal training necessary for the work.

Garbage Disposal at Dayton, Ohio

A RECENT press report appears to indicate at least a partial disappointment of the hopes entertained by the citizens of Dayton when, in 1904, a ten-year contract was entered into with the local Edson Company for the disposal of the city's garbage by the reduction process. A plant of sixty tons daily capacity was erected, and there has been considerable trouble with its operation, an important cause of complaint being the excessive amount of benzine required as compared with the quantity on which calculations were based. Two cars of benzine per year were stated as being likely to meet the requirements, while a car a month has been actually used. Added to this, complaints from nearby residents are growing plentiful, the allegation being made, in one instance, that the plant was placed in its present location by stealth, after it had been given out that it was to go four miles further out. In another case, it is alleged that the odor from the combined reduction and fertilizer plants was responsible for the closing of school-house windows last summer. It should be noted, however, that these complaints are entirely out of harmony with results achieved by the same process in other cities, notably in Toledo, Ohio, referred to on page 154 of THE MUNICIPAL JOURNAL AND ENGINEER of October last.

THE CONSTRUCTING ENGINEER*

His Position and Duties in Relation to Inspection and the Enforcement of Contracts

By Albert J. Himes, M. Am. Soc. C. E.

One of the most useful things which can be done by an inspector of field construction is to keep a daily journal of the progress of the work, carefully noting every occurrence which may have a bearing on the settlement of the contract. Such a journal, when supplemented by photographs, is not easily controverted, and will often clear away disputes which might otherwise be taken into court. . . . .

There is much said about the relations existing between the parties to a contract and the engineer, it being generally held in the profession that his attitude should be strictly impartial and that he should be no less alert to guard the interests of the contractor than those of his employer. Such a condition is a pleasing fiction, quite flattering to the engineer and agreeable to the contractor. It is conducive to harmony and good feeling, and is morally elevating; but, from the contractor's standpoint, or from a legal point of view, in what way can the agent of the party of the first part conserve the interests of the party of the second part when his sole compensation is received from the first party, and without which compensation he might be in danger of hunger? It may be true that some good and noble men have at times defended the rights of the contractor, and, by so doing, have placed their own incomes in jeopardy, but such cases do not make the rule. Engineers are not saints, by any means, and a sensible contractor will look sharply to his own interests where the elements of uncertainty involve large sums.

The real point in question is the clause in the contract which imposes certain duties upon the engineer. In so far as these duties are definite, the engineer should be absolutely impartial, and, to his glory be it said, he generally is. In fact, so far as the measurement of quantities is concerned, the whole system of contracting is based upon the honor and integrity of the engineer. Many thousands of dollars are paid each year on estimates of the engineer which are taken on faith, seldom being questioned unless the contractor is losing money. Engineers are generally honest, but it would not be well for contractors to depend very largely on their assistance. Their duty is to conserve the interests of their employers, and they have the credit of doing so very successfully—in fact, so successfully that their employers, the world over, are the multi-millionaires, while the engineer—has any one heard of a multi-millionaire engineer?

There have been times when a contractor, engaged upon work of unusual difficulty and of great importance, has found himself in financial trouble and has been aided in some way to finish his work. He may have been given more work at a better rate, or he may have been given extra compensation. Such things are done, not in the nature of generosity, but because, in an emergency, it has seemed the best way to keep his plant and force at work and complete the undertaking. One should not get the idea that such things are gratuities. . . .

No inspection can be made of much value unless supported by power to secure what the inspector demands. As we have seen, this power should be provided in the contract, and is vested primarily in the party of the first part. The power of the engineer lies first in his knowledge of the subject, and his ability to demonstrate the injury that may result from a failure to carry out his plans.

A secondary power lies in the custom of making payments subject to his approval. He can, by withholding payments, be sure that his protests will be heard; but it must be assumed by the inspector that power exists to sustain his action, and to the full support of that power he is surely entitled. It is a waste of money to keep an inspector on a job if his reports are not to be heeded, but it is also far worse than that. If the contractor finds the inspector has no support, his presence will be ignored, and the work will suffer. Were there no pretense at inspection, the case would not be so bad, but, in placing an inspector in a piece of work, the engineer says in effect to his client, "Your work is under close supervision and will be properly done." Then, if he ignores his inspector, he deceives his client.

Owing to the imperfections of human life, it will always be true that, for one reason or another, some inspectors are incompetent, but their cases should be exceptional. It is fair to presume that the inspector knows his business, and, in employing him, the engineer becomes his sponsor. That inspectors are discharged and transferred is not always their own fault. Lack of moral courage, ignorance of the necessities of the work, and inability to direct the work of others are some of the faults which engineers display in handling their inspectors. Lack of appreciation is another. Few things will do so much to aid and encourage an inspector as the knowledge that his superior is familiar with and pleased by his work. The inspector's failure to please is often due to the fact that his chief has failed to keep in touch with him and let his wants be known. Perfect loyalty is expected from an inspector, but such loyalty requires a confidence which is the result of close personal relations. . . .

In looking back over the subject, an estimate may now be formed of the preparation or training desired in a

* Concluding portion of a paper, (condensed), discussed by the American Society of Civil Engineers, January 3, 1906. Continued from page 130 of the MUNICIPAL JOURNAL AND ENGINEER of February 7.

prospective inspector. As the term has been used somewhat loosely, to apply to engineers in charge of construction as well as to men whose duties are confined to a specific subject, it is necessary to discriminate. The engineer, of course, must have a technical training, but his education should be broader, embracing something of law and of business methods. These things he may acquire by experience. He should be brave morally, never hesitating about a question of honor, and he should be just and honorable in all his business relations. To these qualifications he must add a liberal supply of tact. Without it the struggle is too hard. He might better expend his energies in some other direction.

An inspector may or may not have had a technical education. It is always an advantage, but seldom essential. He needs principally a few years of experience in the affairs of the world, a fair degree of intelligence, unquestioned honesty, and a generous amount of tact. An effort is sometimes made to get a mason to inspect masonry, a woodsman to inspect ties, and so on. Such a policy is wise at times. Very often it is not. The plans for engineering work so often vary widely from the local practice in various callings that preconceived notions are a detriment, and detract from one's value as an inspector. An inspector's mind should always be open to receive new instructions. He should not answer "Yes, yes," to questions about his understanding of a given matter, and then govern his actions entirely by his own experience. He can much better dispense with the previous experience.

Inspectors trained directly in the work they are to do are most desirable, and the best way to get them is to train them. For this purpose, the young technical graduate is without a peer. His education enables him to grasp readily the fundamentals of the subject; his mental attitude is that of one ready to learn, and the ambition and energy which have enabled him to complete successfully a difficult course of study will enable him to overcome most of the difficulties of inspection. Such men also outrank the average man in integrity and honor, and have a breadth of view that enables them to comprehend the whole situation. Their greatest lack is tact, for where the mind is steadily concentrated on study for too long a time it does not seem to grasp the common affairs of everyday life. This deficiency is sometimes made up very quickly and sometimes not at all. Without tact, a man should not be an inspector. With it, he need have no doubt of his success.

Garbage Disposal in St. Louis

UNDER this caption, on page 219 of THE MUNICIPAL JOURNAL AND ENGINEER of November last, we referred at some length to a report by the Public Sanitation Committee of that tiey's Civic Improvement League, in which the existing arrangements for garbage collection and disposal were criticized in plain terms. What we take to be an amplification of that report, dated 1906, has now reached us and bears abundant evidence of the care devoted to an inquiry stated to have covered a period of three years. The collection and disposal of a city's waste is declared to be "one of the most important duties of the municipal government—one which affects directly and vitally the health and comfort of every citizen. It is not a question of politics, nor one in which there is any reason for a conflict of interests either economical or politica[1] It is a problem of such serious import to the welfare of a city that its solution should command the deep thought and careful consideration of citizens as well as officials."

Proceeding to discuss the problem in its local aspect, the report divides city waste into garbage, rubbish and ashes, of which the first represents, in the average American city, from 12 to 15 per cent.; the second, 8 to 12 per cent., and the third, 65 to 76 per cent. of the entire volume. Garbage is stated to consist of 70 per cent. water, 7 per cent. "rubbish," 3 per cent. grease, and 20 per cent. of fertilizer or tankage. Rubbish contains practically no water and is entirely combustible, while ashes and the waste included under that head are in the main incombustible.

The committee believes that primary separation—the placing by the householder of the different kinds of waste material in separate receptacles—is absolutely essential to proper collection. It recommends the passage of an ordinance requiring every householder to keep on his premises three separate and distinct metallic receptacles—one, a watertight and covered receptacle of a capacity not less than three nor more than ten gallons, for garbage; one, a covered metallic receptacle for refuse; one, a covered metallic receptacle for ashes and other non-combustible waste. Opposition to the proposed regulations is anticipated, but this is expected to vanish as their benefits become apparent.

"No city can make the collection of its waste pay for itself" is the sufficiently broad and uncompromising statement leading up to the dictum that "the problem of collection is to determine upon a perfectly sanitary method which can be effectively operated at a minimum cost." The statements quoted in our earlier reference to this committee's work, in regard to the defects of St. Louis' present methods, are repeated and emphasized, the fact that the city is paying $1.67 per ton for the *collection* of garbage alone being among the more striking figures, especially as applied to the large volume, 70,000 tons, annually dealt with. Short hauls, in preference to the present reliance on "the dump on the river" are advocated and two methods are discussed. Five or more disposal plants could be erected in as many different sections of the city, or an equal number of receiving stations could be provided, each equipped with street car side tracks, driveways and lifting cranes, so that the steel beds loaded with garbage could be lifted from the wagon gear and hauled on flat cars to the scow on the river or directly to the disposal plant. The strong objections to the multiplication of disposal plants are succinctly set forth, the opinion being expressed that these do not legitimately apply to the second course indicated—the establishment of receiving stations. Improved machinery would reduce the present cost of $1.00 per ton for unloading by hand, this being in addition to the $1.67 already cited as the cost of collection.

Thus far, the report deals only with garbage collection, but it proceeds to state that "a city has not fulfilled its duty to its citizens when it has merely collected the garbage which comprises only 12 per cent. or 15 per cent. of its waste. It is as much the business of the municipality to remove the entire waste of the city, including rubbish and ashes, as it is to provide a complete sewer or water system." It is estimated that the average annual expense to the St. Louis householder, for looking up a teamster and having his ash bin emptied, is not less than $5.00; that is to say, on a moderate estimate $500,000 is paid by the citizens, every year, for the removal of ashes alone. The committee recommends, as supplementing the three-division separation system, the collection of ashes and rubbish by the city and the entire prohibition of indiscriminate dumping on vacant lots, in stone quarries, and on swampy lands. "Covered receptacles and covered ash-collecting wagons would reduce the dust and dirt in the city at least 30 to 50 per cent."

In regard to the ultimate disposal problem, the report refers to British practice, only to dismiss it as inapplicable to America, and, indeed, to other European conditions. Paris is stated to have found a destructor plant not sufficiently satisfactory to warrant the adoption of incineration for the entire city, while Berlin made an absolute failure of the system. In addition, the general principles of economy are said to be violated by a system in which "the combustible rubbish, to which is added a considerable quantity of coal, is required to dry out the 70 per cent. of water in the garbage in order to put the other 30 per cent. into condition to burn itself." This general statement is put into concrete form by saying that "$2.69 worth of rubbish is being burned to remove 1,400 pounds of water from a ton of garbage in order to prepare the residual 600 pounds, worth $3.00, for burning itself." Instances are cited, among them being New York, Pittsburg, Wilmington, Grand Rapids, Atlanta and San Francisco, in which incineration has proved unsatisfactory from one or more of various reasons, but the better success of smaller American cities in this direction is appreciatively recorded.

Reduction is next taken up for discussion, with the result that this process is unanimously recommended for adoption in St. Louis. As regards rubbish, the committee recommends the erection, by the city, of a refuse furnace and utilization plant; the extraction of the saleable parts by contract; the steam sterilization of rags; the burning of all non-saleable material, and the production, in this way, of steam, to be applied to the heating and lighting of city buildings. Ashes, it is suggested, can be chiefly used for filling purposes, their bulk in St. Louis amounting to 340,000 tons annually. Street sweepings can be disposed of, until there should be a market for it as fertilizer, along with the ashes, or burned in the destructor, while barn litter is already satisfactorily collected and got rid of.

The concluding section of the report is devoted to an estimate of the cost of garbage disposal by (*a*) the existing system (*b*) incineration, and (*c*) reduction, with the result that "St. Louis can collect and dispose of her garbage by the reduction process, and her rubbish by burning, for $100,000 less than by attempting to dispose of it collectively by the incinerating process within the city limits." Municipal control is advocated for any system adopted, the disadvantages of the city contracting for the work of collection being especially insisted upon. A study of the figures reveals some grounds for disappointment among those smaller communities which will naturally look to a city of this size, after three years' investigation, for more detailed data in regard to the annual cost of plant renewals, the cost per ton of reducing and incinerating respectively, the value of saleable materials, the useful effect of steam derivable from combustion, and other items which go to make up important factors of the problem. This, however, does not materially affect the value of the report as a local guide; the city is, in fact, under heavy obligations to its Improvement League for the work thus entered upon and completed.

Municipal Ownership

THE Current Topic Club of the Elmira Young Men's Christian Association devoted the evening of January 23 to the reception of a paper by Prof. H. Adelbert Hamilton, of Elmira College, in which the arguments for and against the municipal ownership of public utilities were presented at considerable length. After a reference to the importance recently assumed by this topic, the speaker defined the needs of the case as chiefly concerning the water, light, street railway and telephone service in cities. "These are cases," he said, "in which, I believe, competition is either impossible or undesirable, so that the question may be broadly stated—How are we to deal with monopolies based on the right to use public property, especially the public streets? Let us try to be as sane and fair as possible. Let us not take the position that corporations have no rights which municipalities are bound to respect. Let us remember that American cities owe much to private enterprise, that many corporations have obtained their franchises honestly and in good faith and that their managers are convinced that an earnest effort to give the public the sort of service they want is the surest road to success. On the other hand let us not shut our eyes to plain facts, for it is notorious that some public service corporations have gained enormous unearned wealth out of privileges granted to them by the public, and they have not always made these gains honestly either.

"The most striking conditions in some of the largest American cities make strong arguments for municipal ownership. Thus, the Municipal League of Philadelphia declares that ten leading street railway companies of that city have an actually invested capital of about six millions. On this actual investment their dividends for a period of ten years would average over 25 per cent. a year. Naturally the market value of the stock is always up; it is thirty-eight millions. So the street car fares of Philadelphia pay interest on thirty-two millions which have never been expended for the people's use.

"Chicago has a very successful plant of its own for its water supply, and by operating its own electric light plant the cost of arc lights has been reduced from $96 to $56 a year. Detroit furnishes arc lights by its own plant for

about $40. New York pays a private corporation $149! In Elmira the city pays $80, about an average price."

Prof. Hamilton spoke at length in regard to the over-capitalization of corporate concerns, instancing, on the authority of a writer in *The International Quarterly*, the street railways of Chicago, capitalized at one hundred and fifty millions while actually worth only one-third of that sum. New York was cited as a city in which the "street railway franchises have grown so vastly in market value that she cannot now afford to buy them back, though probably about 80 or 90 per cent. of these valuable properties is watered stock."

In regard to the water supply of American cities it was stated that "the trend is steadily in the direction of municipal ownership, though most of our large cities have it already, as have nearly all the cities and towns in England. The result seems certainly to be a cheaper service. M. N. Baker, a high authority on American water works, after investigating about 750 public and private plants, reports that the rates of the private works average 43 per cent. more than those of the public ones. The private waterworks of San Francisco are said to clear 40 per cent. a year on the actual investment, and the case seems to be a still more glaring one when we are told that the service is very meagre.

"Very few American cities have tried municipal ownership for gas lighting plants; only fourteen in nearly a thousand plants are owned by the public. With electric light the case is different. Public plants are steadily increasing and many of them are in small towns. Professor Commons finds that the usual rate for public plants is one-half cent per meter hour and for private plants one cent per meter hour."

The speaker proceeded to ask whether, in view of these facts, it would be wise to jump at the conclusion that municipal ownership is beyond a doubt desirable. "The great general argument against it," he pointed out, "is the *laissez faire* or 'let well enough alone' argument, based upon the idea that that government is best which governs least. Just now this is a favorite argument with the corporations, naturally enough at a time when they are being threatened on all sides with governmental interference.

"By way of reply to all this it may be said that the argument in regard to the dangers of municipal corruption is less fatal now than it was years ago. Our city governments are better than they were and we expect better things in the future. Perhaps some day we shall do as well as they do in Germany. Perhaps the opponents municipal ownership, by pointing out to us the weaknesses of our political methods, may help us to improve them, and it would not be difficult to show that public service corporations have been one of the harmful influences which have corrupted city politics in this country. Men of influence have drifted into politics and become bosses simply through being managers of these corporations. Franchises have been a fruitful source of municipal corruption. There is a suspicion, too, that some of the items in corporation accounts under the head of legal expenses were really expenditures for political purposes. On the other hand, political bosses have been in some cases able to dispense to their henchmen places in the companies' service much as it is their custom to do with the places in the service of the city. Surely they must render the corporations some return for all this. Indeed, it has been said, with some truth perhaps, that 'the government must own monopolies or the monopolies will own the government.' Under municipal ownership would not many influential men, who now as directors of public service corporations play a selfish part in their own financial interest, then be, as consumers and taxpayers, vitally interested in securing good government? If they would, then perhaps the social advantages of such a change would do much to counter-balance any money losses under city management."

Little importance was attached by the speaker to the arguments based on the greater economy of private as compared with public management, believing that the value of the franchises, reaching private pockets, more than offsets the waste due to public control. On the other hand, "public ownership ought to bring about a greater economy, for cities can regularly borrow capital at a lower rate than private concerns. Investors in city bonds are satisfied with a moderate rate of interest. Syracuse and Dunkirk have borrowed at 3 per cent., Rochester at 3½ per cent. Many water, lighting and street railway companies have been paying from 5 to 7 per cent. Surely a difference of two per cent. in the interest rate is a large item. Further, municipal plants have no watered stock crying for dividends. Instead of being over-capitalized they are often under-capitalized, for as time goes on there is often a natural increase in the value of the plant without any corresponding expenditure of capital."

In concluding his address, Prof. Hamilton reminded his audience that the intelligent middle class of the country holds the balance of power, and that it has already decided against the giving of further perpetual franchises. Facts already before the public have brought home to all the importance, in our civic life, of the public service corporations and their franchises, and "if we are to have municipal ownership we shall at least go into it with our eyes open."

Wood Block Pavements

WITH minor variations, wood pavements have been common in Europe for several decades. In the United States, wood pavements were laid a generation ago, under the Nicholson and other systems. The blocks were laid on a plank foundation, with tar or paving cement between the joints. They were not made waterproof or treated in any way to prevent decay, and as a result they swelled with the moisture and caused the pavement to buckle, unless the joints were excessively wide, in which case the wood broomed off at the edges and soon became soft and uneven. The wearing qualities of this pavement were so poor that cobble stones, which took their place, were regarded as an improvement.

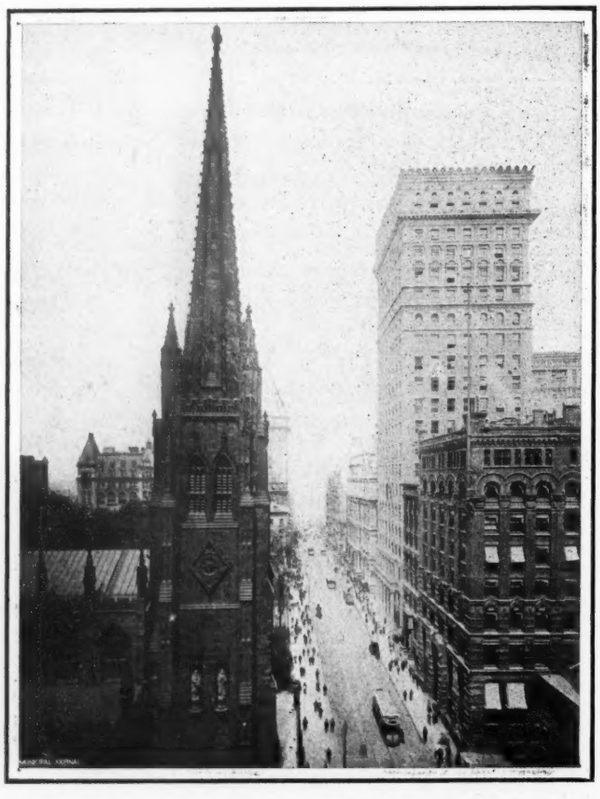
The modern wood pavement is entirely different. The

creo-resinated blocks made by the U. S. Wood Preserving Company, which are now being laid in New York, are thoroughly impregnated with a mixture of creosote and resin, the blocks being treated, to the heart, with twenty-two pounds of preservative mixture to the cubic foot, and nothing but heart long leaf pine is employed. The specification provides that "after treatment, the blocks shall show such waterproof qualities that, after being dried in the oven at a temperature of 100 degrees for a period of twenty-four hours, weighed, and then immersed in clear water for a period of twenty hours and weighed, the gain in weight shall not be greater than three per cent." This is regarded as demonstrating the value of the resin in the mixture, its purpose being to keep water out of the block and prevent the washing out of the preservative, creosote.

The foundation of the modern pavement calls for 4½ inches of Portland cement concrete, over which is spread a half-inch bed of cement mortar, struck to a true surface exactly parallel to the finished surface of the pavement.

Wood blocks, usually eight inches long by four inches wide and three and one-half inches deep, are bedded in this cement with the grain vertical. Sand is then brushed over the street and left for a few days to be ground into the surface of the blocks by traffic, also filling up the joints. Treated in this way, the blocks offer much resistance to the effects of traffic, the wear upon the end grain of the wood being trifling as compared with what happens to flat-laid timber.

The first street in this country to be paved with U. S. Creo-Resinate wood blocks was Tremont street, Boston, in the year 1900. Careful measurements are stated to have shown a depression of about one-eighth of an inch after the first two years, most of which is claimed to have been due to compression, and not to wear.



BROADWAY, NEW YORK CITY, LOOKING NORTH FROM TRINITY CHURCH

The claims made for this pavement refer to its durability, its sanitary and antiseptic qualities, the facility with which it can be cleaned and repaired, its non-slipping surface and its relative freedom from noise. Vehicles pass over its smooth surface without any rattle or bang; blows from horses' hoofs, instead of making a sharp metallic sound, cause only dull hollow thuds, as on a dirt road. In fact, the silence of this pavement is among the leading claims made in its behalf. Broadway, New York City, is now to be laid with it from the Battery to Vesey street, a length of 2,870 feet. A portion of this section is shown in the accompanying illustration.

The Luitwieler System of Pumping

THE improvement made in pumping apparatus has kept pace with that of other lines in the mechanical field. The Luitwieler Pumping Engine Co. announced to the world a few years ago that it had designed a system whereby, with pump pistons of the reciprocating type, uniform action on the water was secured, so that the labor was uniform in stress as well as the stream being pulseless in delivery.

This is accomplished by the use of cams, placed upon a shaft, which rotates in bearings on either side, bringing into action a vertical movement of the crossheads, which are balanced. These crossheads operate the connecting rods and pistons in straight line, as shown in Fig. 1. The housings are of the hollow column form, having bearings for the cam shaft at opposite sides, in which the cam shaft rotates. The chilled-faced cams are set upon the shaft at an angle of 180 degrees; they have a track upon which is carried a chilled-faced roller. The roller, as it moves upon the face or track of the cam, moves the crosshead with its water load up in a vertical line. At the lower end of the crosshead is a roller with a narrow face, moving upon another track of the same cam. This produces the return of the piston in the opposite direction in shorter time than the piston moves upward, this action being accomplished by the mechanical design of the cam. The lifting side of the cam covers 53 per cent. of its circumferential travel, while the non-lifting side covers only 47 per cent. that is to say, the return stroke of the pump is made in slightly less time than the lifting stroke. This allows the piston to return so that it can begin lifting again before the preceding one ceases to complete its lifting stroke.

In this way the work is made continuous; the cams are of such design that the water movement is continuous without variation in quantity or speed.

These pumping engines are usually made with two cams and are universal in adaptation to any pump to raise any kind of liquid, and to pump water from deep wells or mines, by placing the pumps hundreds of feet below the pumping engine, which is located at the surface of the ground.

When pump-rods are used, they are in perfect balance

and do not call for the expenditure of power to move them. For deep pumping, the rods extend to the bottom and are attached to outside packed plungers. This type of pump is placed directly under the pumping engine. It is used for any pressure duty, and maintains a steady even pressure. This admits of a great variation in pressure, as a plunger of any diameter from two inches up to ten inches may be used with the same pumping engine, provided that the length of the stroke is the same.

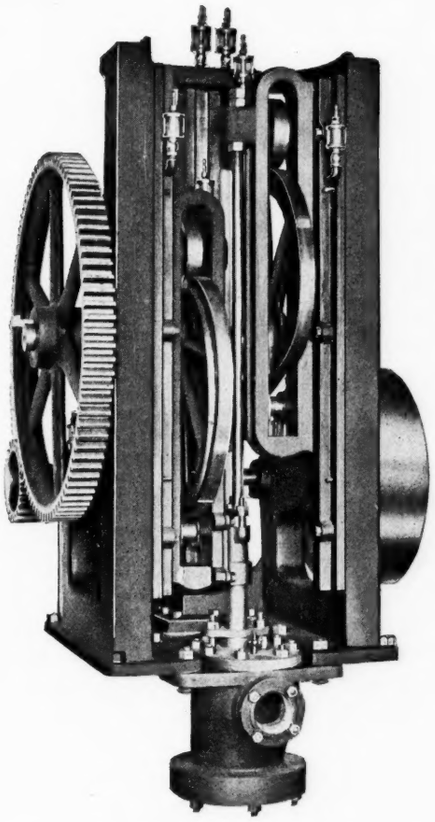


FIG. 1.—LUITWIELER ENGINE, FOR BELT POWER

These pumping engines, having a constant load, admit of the power being placed upon the same base with the pumping engine, and they are then called steam pumping engines, gasoline pumping engines, or electric pumping engines. As shown in the accompanying illustration, these pumping engines when used for deep well pumping are provided with a gypsy hoist to raise the rods and pistons from the well to the surface for repair, when needed. They occupy but little space, and being balanced, operate without being bolted to a foundation and do not vibrate or creep when working on a full load. They are noiseless in operation, and are particularly adapted to the use of city waterworks, hydraulic elevators, paper mills, railroad tank service, mine pumping and any class of hydraulic duty where high efficiency is required.

The Luitwieler Pumping Engine Co. claims a saving of 15 per cent. of the power used by triplex pumps, 25 per cent. of the power used by double-acting power pumps, 60 per cent. of that used by horizontal steam pumps, 70 per cent. of that used by vertical deep well steam pumping engines, and from 60 to 80 per cent. of the power used to raise water by compressed air.

The high efficiency of the Luitwieler System, the manufacturers say, enables them to raise water as cheaply with a 10-horse power plant as is usually done with the largest municipal pumping engine.

The Champaign & Urbana Water Co., of Champaign, Ill., now has four Luitwieler pumping engines in use and has contracted for another to be installed April first next. The Mattoon Clear Water Co., of Mattoon, Ill., has five Luitwieler electric pumping engines now in use on deep wells, having taken out the steam pumping engines. The University of Illinois has two Luitwieler pumping engines.

The Luitwieler Company will soon arrange to manufacture its pumping engines in the East, having secured liberal offers of factory location and bonus. When the company's facilities will admit of taking on more work, it will build and put upon the market an Automobile Fire Apparatus designed for cities that have not been able to enjoy the luxury of a paid Fire Department on account of its high first cost and maintenance charges. The Luitweiler Auto is to have a propelling power of 32 h.p. gasoline, with a speed of 25 miles an hour. It will carry the pumps, sixty gallons of chemicals, and the hose for chemicals and water and be capable of throwing 300 gallons per minute against a pressure of 80 pounds to the square inch. The weight will approximate 5,000 pounds. It will require one engineer (paid), and a volunteer crew having bunks in the engine house. Luitwieler pumps, being non-pulsating in action, do not depend on excessive speed to throw a fire stream as do steam fire engines, but show a steady stream at slow speed. Under maximum duty the speed of the pumps (three in number), would not exceed fifty revolutions per minute, while there would be no jar or vibration of the apparatus other than that caused by the operation of the gasoline engines, as ordinarily found in all automobiles.

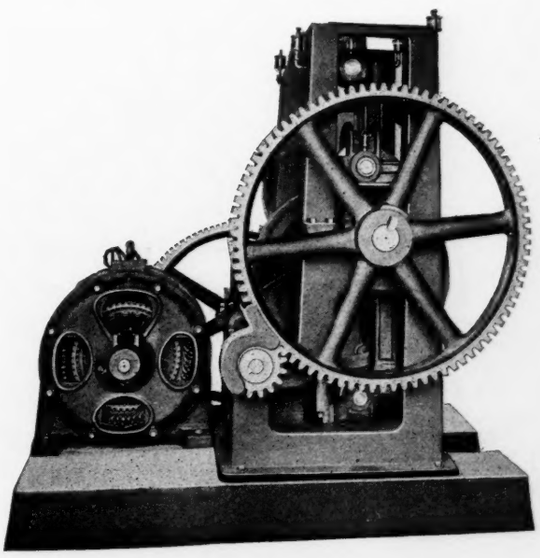


FIG. 2.—LUITWIELER PUMPING ENGINE, WITH ELECTRIC MOTOR

Garbage Disposal in Jacksonville

An interesting experiment, now being made in this Florida city, will be watched with interest by other communities. A plant which has been installed by Mr. A. O. Wright, 35 East Bay street, Southern representative of the Sanitary Reduction and Construction Company, of 49 Federal street, Boston, is designed to effect the reduction of garbage, including kitchen waste, dead animals, night-soil, butchers' offal, etc., in such a way as will yield a profit in the form of fertilizer and other by-products, estimated at from $10 to $30 per ton of output, according to the character of the matter treated, instead of ignoring a valuable source of revenue.

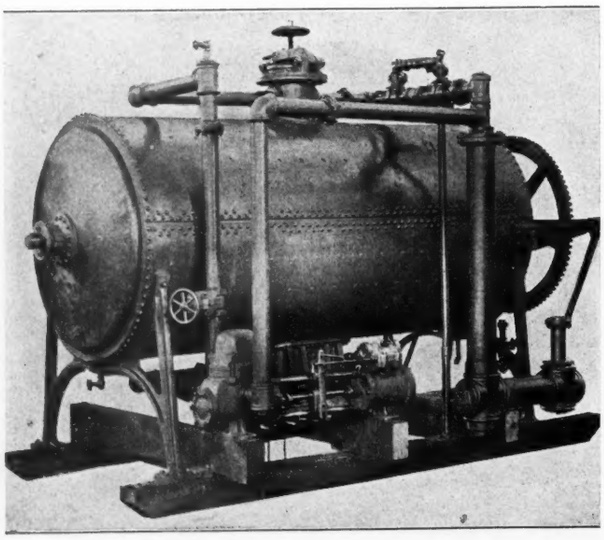
The salient features promised for the system are that it is absolutely odorless, all foul gases being condensed and led under the boiler and consumed in the furnace; that it is sanitary, as all matter treated is subjected to a temperature of 300 degrees Fahr., thus destroying all disease germs; and that it is economical, as instead of the garbage being destroyed, it is converted into valuable products.

The garbage reduction machine consists of a large steam-jacketed cylindrical tank, connected with a boiler, with an attached vacuum pump and condenser and an unattached cooler. When full, the tank holds five tons of garbage. When charged and hermetically sealed, a reel running through it, acting as a stirrer, is set in motion. Steam is turned on for an hour in both the jacket and the tank, killing all the disease germs and fairly cooking the mass. The steam supply to the inner cylinder is then shut off and the vacuum pump and fume condenser turned on for three hours more, when the operation is complete.

During the process about 7,500 pounds of water is sterilized and led off as a harmless effluent into the sewer. If the mass be animal matter about 500 pounds of oil is gathered into the cooler, all smells being led away to the furnace and consumed. There remains in the tank about 2,000 pounds of tankage, worth from $7.50 to $25 per ton as fertilizer, while the oil, at three cents a pound, is worth $15 more.

The refuse furnace, costing $1,000, is a recently patented machine for utilizing all dry rubbish to the best advantage as fuel, and is attached to the boiler. It is estimated that sufficient dry refuse to run the plant will be collected each day. The night-soil machine is similar to the garbage machine except that the matter is treated with a five per cent. solution of sulphuric acid instead of steam.

These machines are the invention of F. G. Wiselogel, of Indianapolis, Ind., who was for many years connected with the St. Louis Sanitary Company.



THE WISELOGEL GARBAGE REDUCING TANK

A Police Patrol Automobile

The report of the Springfield, Mass., City Marshal for the year ended November 30, 1905, contains detailed references to the work of a police patrol automobile, furnished to the city by the Knox Automobile Company, a local firm. This is a two-cylinder, 16-h.p., air-cooled engine, with solid tires; tire-chains are fitted to the rear wheels for preventing skidding in bad weather.

It appears that 1,199 day runs and 990 night runs, aggregating 5,178 miles, were made, the cost of gasoline and oil amounting to $146.25. Adding the entire repair bill ($168.35), a total maintenance cost of $314.60 is shown, representing 6.07 cents per mile and 14.33 cents per run. Strictly speaking, $75 of the repairs account was not normal expenditure, having been necessitated by an accident to the main shaft through skidding, before the tire-chains were applied. In addition, the night driver now makes ordinary small repairs.

City Marshal Stebbins is enthusiastic over the possibilities of this class of machinery in this field, as well as in the fire departments of cities. It costs, he says, more for shoeing horses than for ordinary repairs to these machines, while the cost of horse feed is more than double the cost of gasoline and lubricating oil.

A Civil Service Vacancy

A Topographic Draughtsman, required by the U. S. Post Office Department, is apparently not easy to find, none having been secured as the result of an examination held January 3-4. The Department now calls upon qualified persons to register for an examination to be held March 21-22. The salary is $900 per annum, and the subjects of examination include letter-writing, arithmetic, elementary algebra, plane geometry, mapping, drawing and lettering. Intending candidates should apply for Form No. 1312 at the office of the U. S. Civil Service Commission, Washington, D. C.

Indianapolis, Ind., may adopt pressure sprinklers for street cleaning; Mayor Bookwalter favors this course and seeks to know whether the Water Company can be compelled to furnish water free, as it does for hose flushing.

THE WEEK'S CONTRACT NEWS

RELATING TO MUNICIPAL AND PUBLIC WORK—THE CONSTRUCTION FIELD—PROPOSALS AND CONTRACTS—SEWERAGE AND WATER SUPPLY, STREET IMPROVEMENT AND LIGHTING—FIRE EQUIPMENT —BUILDINGS

STREET IMPROVEMENTS

Mobile, Ala.—Plans have been prepared for paving outlying streets. Asphalt and vitrified brick will be used. The cost will approximate $350,000.

Bowling Green, Ohio.—Proposals are asked, until March 19, for draining and macadamizing Brown road.—R. C. Harding, County Auditor.

Bluffton, Ohio.—Plans have been approved for paving Main street with vitrified brick at an estimated cost of $60,000. The proposed paving of Center street is before the City Council.

Canton, Ohio.—Bids will be opened, March 12, for paving Walnut street; also for improving Schwalm street, West Second and Wade streets.—C. A. Zellers, City Clerk.

Celina, Ohio.—Proposals are invited, until March 24, for the purchase of Oak Level road bonds.—Richard Severns, Commissioner.

Columbus, Ohio.—The improvement of Broad street is under consideration. An expert commission will prepare plans.

Dayton, Ohio.—Bids for furnishing 1,600 square yards of brick paving will be opened, March 14.—R. E. Kline, City Engineer, William F. Miller, Clerk, Board of Public Service.

Dayton, Ohio.—The City Council has called for plans and estimates for improving a number of streets. Contracts will not be awarded for several months.—R. E. Kline, City Engineer.

East Liverpool, Ohio.—The City Council will shortly take action on the proposed paving of Mulberry street.

Elyria, Ohio.—Ordinances are before the City Council for paving Depot street with brick; also portions of West Third street and Lake avenue. A $15,000 bond issue may be authorized.

Mt. Vernon, Ohio.—A resolution to pave Hamtrack street has been approved. Sewers will also be constructed.

Niles, Ohio.—The City Council has ordered plans and specifications for paving Fifth street.

Portsmouth, Ohio.—The paving of Kendall avenue and the improving of Front street are being considered by the City Council.

Springfield, Ohio.—The cost of macadamizing Monroe street is estimated at $675. It is proposed to improve Columbia street at a cost of $4,200.—W. H. Sieverling, City Engineer.

Wooster, Ohio.—The City Council is considering plans and specifications for paving North Walnut street. Sewers will also be laid.

Youngstown, Ohio.—Plans have been prepared for improving Warren street, Delason avenue and portions of Market street. Oakhill avenue, High street to the city limits, will be paved.

Altoona, Pa.—A bond issue has been authorized for paving a number of streets. Preliminary plans have been approved.—Harvey Linton, City Engineer.

Meadville, Pa.—Bonds for $58,000 will be issued for local improvements. One mile of paving on Park avenue will be undertaken.—Henry Haas, City Comptroller.

York, Pa.—The matter of opening West Mason avenue is still under consideration. —City Engineer McKinnon.

Providence, R. I.—The State Senate has approved a bill for a $600,000 bond issue for constructing highways.

Memphis, Tenn.—It is proposed to ask bids for opening and improving five miles of streets at a cost of $200,000.—James A. Omberg, jr., City Engineer.

Chihuahua, Mexico.—It is reported that $200,000 will be expended during the year for paving the streets with asphalt, particularly in the business district.

SEWERS

Bisbee, Ariz.—The proposition to issue $80,000 in bonds for sewer construction will be voted on at an election, March 20.

Oakland, Cal.—The City Attorney is preparing an ordinance authorizing an election to decide the question of issuing bonds for sewer construction.

Pasadena, Cal.—The City Council is considering plans of City Engineer Pearson for building sewers along Los Robles avenue, Buckeye street, Mountain street and Euclid Avenue.

Marietta, Ga.—An election will shortly be held to authorize a bond issue for constructing sewers; also for street improvements.

Rockford, Ill.—Plans are being prepared for constructing sewers in several streets.

Tulsa, I. T.—Sewer bonds for $70,000 may be issued. The question is being considered.

Eldora, Iowa.—Proposals are asked, until April 2, for constructing drains in Hardin County, District No. 1.—J. S. Newcomber, Auditor.

Minneapolis, Minn.—The State Legislature will be asked to authorize a $750,000 bond issue for building sewers.

Norfolk, Neb.—The proposition to issue $42,000 in bonds for constructing sewers will come up at the spring election.

Norwich, N. Y.—The proposed expenditure of $15,000 for extending the sewerage system will be voted on at the spring election.—E. F. Musson, City Engineer.

Akron, Ohio.—The city will spend $33,000 for building sewers in the Southern district. March 14, for constructing sanitary sewers in district No. 8; also in sewer district No. 5. Approximately 31,000 feet of 8-inch pipe will be required.—W. F. Miller, Clerk, Board of Public Service.

Dayton, Ohio.—Proposals are invited, until March 14, for furnishing 3,200 feet of 8-inch vitrified sewer pipe; also manholes and flushtanks.—R. E. Kline, City Engineer.

Glendale, Ohio.—Proposals will be received, until March 12, for constructing sewers.—J. J. Gutting, City Clerk.

Salem, Ohio. — The City Council will build a sewer in Broadway.—George Holmes, City Clerk.

Oklahoma City, Okla.—New bids will be received, March 19, for constructing the sewerage system.

Ponca City, Okla.—Bonds may be issued for constructing sewers; also for waterworks.

Erie, Pa.—The Street Committee, City Council, will receive proposals, until March 31, for constructing a 9-inch tile sewer in Twenty-ninth street; also a sewer in Twenty-fourth street.

Washington, Pa.—It is reported that the sewage disposal plant will be abandoned. A new system of disposal is under consideration.

Seattle, Wash.—An ordinance will be introduced into the City Council for the construction of the $750,000 North trunk sewer. Preliminary plans are being prepared.—R. H. Thomson, City Engineer.

WATER SUPPLY

Selma, Ala.—Bonds for $150,000 may be voted, April 2, for constructing waterworks.

Chicago, Ill.—Proposals will be received, until March 20, for installing three steam purifiers at the Chicago Avenue pumping station.—J. M. Patterson, Commissioner of Public Works.

Columbia, Mo.—A special election will be held, March 10, to authorize a $30,000 bond issue to complete the waterworks. Two new engines, one dynamo and a high-duty pump will be installed.—Stanley Smith, Mayor; John S. Bicknell, City Clerk.

Buffalo, N. Y .—A bill before the State Legislature authorizes the city to issue $2,500,00 in bonds for improving the waterworks.

Gilbertsville, N. Y.—The people will vote at the spring election on a proposition to improve the waterworks; estimated cost, $2,300.

East Liverpool, Ohio.—Preliminary plans are under consideration for constructing filter beds. The estimated cost is $30,000.

Mansfield, Ohio.—Water mains will be extended at a cost of $7,500.

Toledo, Ohio.—It is reported that the contract with the Norwood Engineering Company for erecting the filtration plant has been declared illegal. A new contract may be made.

Altoona, Pa.—The people have voted to expend $300,000 for improving the waterworks. A new impounding dam will be constructed at Kittanning Point.—Harvey Linton, City Engineer.

Reading, Pa.—The Water Commissioners will shortly ask bids for supplies for the Water Department.

Nashville, Tenn.—An ordinance is before the City Council for constructing settling basins at Todd's Knob.

Waco, Texas.—Plans are being prepared for extending water mains in several city districts.—S. P. Sample, Superintendent, Water Works.

Whitesboro, Texas.—Work will begin, April 1, on the construction of water-works.

Norfolk, Va.—Bids will be opened, March 13, for constructing a water system at the Marine Barracks, Norfolk Navy Yard. — Colonel F. L. Denny, Quartermaster.

Norfolk, Va.—New plans and specifications will be prepared for building the coagulating basin at the waterworks pumping station.—Chief Engineer Wright.

LaCrosse, Wis.—The people will vote on the proposed $75,000 bond issue for improving the waterworks; also for constructing filter beds.

Vancouver, B. C.—Plans are being prepared by the City Engineer for new waterworks, to cost approximately $750,000.—Mayor Buscombe.

PUBLIC LIGHTING

North Birmingham, Ala.—The question of issuing $10,000 in bonds to improve the electric-light plant is being considered.

Anaheim, Cal.—An election will be held, March 14, to decide the question of issuing bonds for the improvement of the electric-light plant.

San Diego, Cal.—A new gas company is being organized, and a $200,000 plant will be built.

Colorado City, Col.—Bonds may shortly be issued for constructing a municipal electric-light plant.

Washington, D. C.—Proposals are asked, until March 14, for installing electric wires in the United States Post Office building at Ogden, Utah.—James Knox Taylor Supervising Architect, Treasury Department, Washington.

Miami, Fla.—The City Council has granted a franchise to W. W. Prout for the erection of a gas plant.

Louisville, Ky.—The Board of Public Works is considering the matter of improved lighting service for city streets. Additional lights may be authorized.—Mayor Barth.

Detroit, Mich.—The Legislature may authorize a city bond issue of $150,000 to improve the electric-light plant; also for other improvements.

Iron River, Mich.—The question of issuing bonds for constructing an electric-light plant will come up at the election, March 12.

Natchez, Miss.—The city will ask legislative authority to issue $182,000 improvement bonds. It is proposed to erect a municipal electric-light plant at a cost of $75,000; also a new school building; estimated cost, $25,000.

St. Louis (Maplewood), Mo.—A citizens' committee is considering the proposed erection of an electric-light plant.

Asyla, N. J.—Bids are being received for installing an electric-light plant at the County Asylum for the Insane.

Cleveland, Ohio.—Bids will be received, March 18, for installing an engine and generator in the electric-light plant at Warrensville, Ohio.—A. R. Callow, Secretary, Cleveland Farm Colony, Warrensville.

Dallas, Texas.—Bonds will be issued for building an electric-light plant. Plans and specifications have been approved.

Provo, Utah.—An election will be held to authorize a $60,000 bond issue for constructing a lighting plant.

Sunnyside, Wash.—Bonds for $9,000 may shortly be issued for building an electric-light plant.—W. B. Cloud, Chairman, Finance Committee.

Milwaukee, Wis..—It is reported that bids will be asked for lighting the streets for one, two, three and five years. The matter is before the City Council.

FIRE DEPARTMENT SUPPLIES

Little Rock, Ark.—The City Council is considering the proposed erection of a fire station in the First Ward.

Los Angeles, Cal.—Plans have been completed for erecting a new engine house on Mohawk street.

Washington, D. C.—Proposals are invited, until March 12, for fire apparatus and miscellaneous supplies for the Isthmian Canal Commission.—D. W. Ross, Purchasing Officer.

Richmond, Ind.—A $5,000 appropriation is available for equipping a new engine house.

Rochester, N. Y.—The City Engineer is preparing plans for installing a new fire alarm system.

Savannah, N. Y.—An election will be held, March 20, to consider the question of purchasing fire equipment. Bonds may be issued.

Magnetic Springs, Ohio.—New fire apparatus will be purchased.

Portsmouth, Ohio.—It is proposed to furnish improved fire protection for the East End district.

Nashville, Tenn.—Proposals are asked, until March 15, for furnishing three steam fire engines; also for one combination hose wagon, to be equipped with a Holloway chemical tank.

PUBLIC BUILDINGS

Ashland, Ala.—Proposals will be opened, March 15, for the erection of a new Courthouse at Ashland.—Charles W. Carlton, Architect, Anniston, Ala.

Douglas, Ariz.—A new school house will be erected. Bonds for $40,000 will shortly be issued.

Monrovia, Cal.—Preliminary plans for a new school house are being considered. A $28,000 bond issue is proposed.

Washington, D. C.—Bids will be opened, March 19, by the Commissioner of Indian Affairs, Washington, for building a brick school at the Pierre Indian Agency, South Dakota.

Minneapolis, Minn.—Proposals will be received, until March 9, for erecting the East side police station.—L. A. Lydiard, City Clerk.

New York, N. Y. (Brooklyn), Proposals are asked, until March 12, for alterations and repairs to public schools Nos. 44, 84, 144 and 145, Borough of Brooklyn.—C. B. J. Snyder, Superintendent of School Buildings.

MISCELLANEOUS

Centreville, Ala.—The County Commissioners are considering plans for a steel bridge over Six Mile creek.

Denver, Col.—Plans have been completed for constructing a suspension bridge over Royal gorge for a scenic electric railway; estimated cost, $100,000.

Washington, D. C.—Proposals will be received, until April 5, for constructing two steel wharves in Manila harbor, P. I.—Bureau of Insular Affairs, Washington.

Pensacola, Fla.—The Commissioners of Escambia County, Fla., and Baldwin County, Ala., have approved plans for constructing a steel bridge over Perdido river; estimated cost, $3,000.

Detroit, Mich.—Bids are asked by the Michigan Central Railroad, until March 8, for constructing a tunnel under the Detroit river between Detroit and Windsor, Ontario, Canada.

New York, N. Y.—Proposals are asked, until March 14, for furnishing 27 street sweeping machines.—John McG. Woodbury, Commisioner of Street Cleaning.

Columbus, Ohio.—It is proposed to issue $150,000 in bonds for park purposes.

Dayton, Ohio.—Bids will be opened,